The Ecology of Form
Devin Griffiths

Two waves impel this essay: the ecocritical turn and formalist theory. What happens when these waves meet, when we read form ecologically? In what follows, I engage form as an inherent feature of the way both natural and social systems interact, rather than a property imposed on the world by human perception or language. That is, I recognize form as process and generate an ecopoetic theory of relational form.

This requires a shift, because we usually think of forms as stable properties of objects, rather than shifting systems of relation. Sandra Macpherson observes the former in the shared way “an artist, an engineer, a biologist, a linguist, a philosopher” use the notion of form: all see “form as nothing more—and nothing less—than the shape matter (whether a poem or a tree) takes.”

This notion of form as shape, as the stable structural features of specific things, works well when we consider objects in their static totality, but it stumbles when we consider the dynamic processes through which they unfold, when we ask: How does a form take form?

In their shapely materialism, modern formalisms bear the stamp of an old encounter: the conceptual impact of ancient technologies of material fabrication, chiefly, the use of physical molds to cast objects (fig. 1). A mold is a container with a hollow interior into which someone pours a liquescent material that takes the mold’s shape and then hardens into an object. A reusable mold can cast many copies of that object, whether ancient coins, or

I am grateful for the many scholars who have helped me with this essay as I worked on it, especially, for running conversations with fellow members of the VCologies working group, my reading group in Los Angeles, and for comments that I received from Zakiyyah Iman Jackson, Neetu Khanna, Susan Zieger, Emily Wilson, Ashley Cohen, Devin Garofalo, David Coombs, and Michael Tondre, as well as early conversations with Cannon Schmitt. Unless otherwise noted, all translations are my own.

later, printing type. As a container form, the matrix presents the clearest instance of form considered as a shape, instantiated by a specific material object, with an effect dependent on its material properties, and designed for a specific use.

As a technology, the mold produced a new way to make things, but alongside other manufacturing technologies, it also fabricated a powerful way to think about what things are. It clarifies, for instance, the material imagination inherent in Aristotle’s hylomorphic treatment of form (μορφή or morphé in Ancient Greek, later translated as forma in Latin), with lasting impact on Western philosophy. Aristotle’s consistent jumping-off point is the analogy between natural forms (especially organisms) and human artifacts. In either case, form defines what is essential to a given class of things. In the Metaphysics, he elaborates a point made in the Physics: the construction of

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any artifact shows that form is what turns brute matter into a thing. For this reason, it is closely identified with species; he uses *morphé* (form as shape) almost interchangeably with *eidos* (form as essence or kind). Manufacture modeled how form transcends individual objects in a limited sense; it is present in the mind of the craftsman before it is instilled in the object, and the same holds true for life forms, which reproduce by impressing their form on their offspring. In either case, shape is essence, and form is not so much created as *passed along*, immanently manifest in the way it continues to mold new things.³

The fusion of shape and kind in Aristotle’s account generated lasting problems for Western philosophy and aesthetic theory (some of which I review later in this article). And it explains certain habits in the way we think about forms today: our sense that they are the shape of some content, and that they illustrate an important connection between social forms (artifacts) and natural forms (like organisms).

Turning the page on Aristotelian formalism, I begin by noting that the mold cannot contain the pressures of its own formal abstraction. For one, the mold does not mark the relation between a single shape and its individual content but a multiplicity of relations. A reusable mold shapes multiple objects, not just one, but more important is the fact that for any mold to work you have to have at least three different materials—the stuff that constitutes the mold and at least two contents: the stuff that the object will be made from and the emptying content, usually ambient air, which fills the mold before and after its shapeable material is formed and then cast out. The function of the mold is dependent on the material properties of its content and its environment as much as the mold itself; you need a material that can be poured inside and that will then harden and must create conditions (usually by heating and cooling) that will support that action. Finally, a mold is only relatively stable—it wears out with use—and its iterated contents display variation, not to mention the relative skill of its operator.

Rather than a discrete combination of shape and substance, form is a constellation of things and repeated actions. More precisely, any form is a sequence of events that happen at the interface between multiple things—the mold and the behavior of its alternating contents, the air and its atmospheric pressure, and so on. The simple distinction between *form and content* does not adequately capture the dynamic and expanded nature of these relations. In place of moldy formalism, and instead of container form, we need

³ The transmissibility of form explains its seeming transcendence without recourse to Platonic idealism: “Thus obviously there is no need to set up a form [eidos] as a [transcendent] pattern . . . the thing which generates is sufficient to produce, and to be the cause of the form in the matter” (Aristotle, *Metaphysics* 7.1034a).
a relational formalism, a theory of reform. To put this differently, form is ecological; it works through wider networks of relation and of the material, energetic, and social interactions that give it life.

In the article that follows, I derive this relational account of form from the philosophy of Charles Darwin and his lifelong attempt to understand the dynamic processes through which ecologies develop and sustain forms. In order to extend the social and literary implications of this account, I then turn to the “ecological vision” of society produced by Édouard Glissant’s poetics of relation. Read in light of Glissant, the ecology of form produces a new way of reading social patterns in terms of their relation and action in time. I conclude by demonstrating what this might look like in practice, drawing on the materialist shift in critical race studies to explore ecologies of race and migration in Matthew Arnold’s poem “Dover Beach” (1867) and Helen Oyeyemi’s gothic novel, White Is for Witching (2009).

This itinerary—which traces a theory of form from the history and philosophy of science, to postcolonial and critical race theory, to poetics and literary history—makes an argument for form as a promiscuous feature of the world and for formal analysis as a mode of inquiry that destabilizes disciplinary distinctions. Forms, as both natural and social relations, cut across disciplinary divisions of knowledge and require an interdisciplinary approach. In resisting the distinction between natural and social forms, the ecology of form embraces the possibility that our habitual ways of addressing each other and the world, our languages and modes of representation, open up rather than close off our engagement with nature.

1. From Organism to Ecology

Darwin studied ecologies as the complex networks of growth and cooperation, competition and death, through which living and nonliving agents interact. And he understood, as recent theorists of the climate crisis have been at pains to explain, that these networks necessarily include humans and their artifacts as important components. Darwin’s effort to gauge the


5. Jonathan Kramnick and Anahid Nersessian have recently criticized interdisciplinary accounts of form, proposing a “discursive pluralism” derived from debates within the philosophy of science over the relation between formalism and ontology (Jonathan Kramnick and Anahid Nersessian, “Form and Explanation,” Critical Inquiry 43 [Spring 2017]: 669). But why can’t disciplines have multiple objects, with some objects discrete and some shared? In carving the joints of the world to correspond with the disciplines on the model of the sciences, they exchange radical reductionism for radical irreductionism: the claim that none of the key objects of different disciplines are shared.

radical implications of reading humanity’s history into the natural world has had profound consequences for modern thought. In reviving Darwin as a foundational process philosopher and ecotheorist, alongside recent work by Elizabeth Grosz and Eugenia Brinkema, I seek to turn our attention back to the complexity of his ecological thought and the central role form played in Darwin’s evolving account of the living world.7

Darwin’s philosophy continues to resonate because it shifts from reading form as inherent plan or intricate design to reading form for the contingent history of open systems, and from seeing form as a property of individual organisms to recognizing it as a nondeterminative relation between multiple things in process, including human societies. On the Origin of Species is still celebrated for the way it unsettles fixed and essential categories, especially species, sex, race, and the conditions of life (the environment). But this was part of a more general revaluation of form as an object of analysis, whether recognized in natural forms like organisms and their structures, or in cultural forms like language.

Darwin remains one of our most important theorists of form because he abandoned the long-standing relation, established by Aristotle, between form and kind, between morphé and eidos, as well as the relatively closed notion of inbuilt organic form furnished by eighteenth-century theorists. His early publications, which assume a fixed natural order that he already begun to doubt, follow Aristotle in treating physical form as equivalent to species, a marker that defines and separates one true species from another.8 But as he laboriously worked his way through systems of classification,

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8. For example, in his first studies of fossil barnacles, “form” is the morphological counterpart of “species,” its definitive and fixed physical structure: “having the power to identify [species] with ease” proves “the exhaustless fertility of Nature in the production of diversified yet constant forms” (Charles Darwin, A Monograph on the Fossil Lepadidae, or, Pedunculated Cirripedes of Great Britain [London, 1851], p. 2).
beginning with his early studies of barnacles, Darwin’s language of form evolves into a critical reading of natural structures. He soon abandoned his faith in constant form, exploring form as a critical challenge to species stability.9

The extraordinary success of Darwin’s theory of natural selection has overshadowed his more audacious lifelong project: to explain how, in the absence of a design and in the face of constant flux, natural patterns sustain themselves. Form, as evidence of histories of interaction, cooperation, and competition, provided the thread of connection, the clue. *On the Origin of Species* takes the variability of form as the primary evidence of the continuous relation between species, individual, and environment. Darwin adapted form to study the relation between widely different forms of life and so gave an ecological reading of form and its bearing for the study of humanity and social structures. Darwin’s efforts to read such forms—not as carefully engineered correspondences between organism and the world but as a network of uncertain adaptations—initiated a more important transformation, exploring form as a new way to read ecologies: “The structure of every organic being is related, in the most essential yet often hidden manner, to that of all other organic beings” as well as the “elements” of their environment, whether recognized in “the structure of the teeth and talons of the tiger” or “in the beautifully plumed seed of the dandelion, and in the flattened and fringed legs of the water-beetle.”10 Living forms record longer, chance-ridden histories of interaction between being and environment, of content and extant. Driven by action and reaction, competition and cooperation, violence and care, such structures testify to an ecology of forms.

Darwin sets out his most elaborate account of the ecology of form in the final phase of his thought, as he focused his attention on its implications for the seeming integrity of organic bodies and the status of social forms. In *Variations Under Domestication* (1868), Darwin turned to the problem of inheritance and the question of how organisms maintain their physical integrity despite both the influence of their environment and the inheritance of traits from physically different parents and ancestors. How were all of these influences knit together? Darwin’s proposed solution, which he termed pan-genesis, was a radical speculative leap. Through pan-genesis, Darwin theorized, all the minute parts of the body reproduce themselves independently through interaction with the new conditions they encounter. Theorized as

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9. “Now if we reflect that form, size, state and nature of the surface . . . are all highly variable in most of the species . . . we shall perceive how difficult it must ever be to distinguish the species from external characters” (Darwin, *Monograph on the Cirripedia* [London, 1854], pp. 186–87).

the transmission of various particles of formative matter, which grew and reproduced themselves in the environment of the body, pangesis read the ecology of form into the body itself, rearticulating the organism as an ecology of semiautonomous circulating forms. Hylomorphism resurfaces in formative matter but with a twist: the form that is transmitted is never quite the same; its persistence as a regulative principle disappears. Interacting with the world, the relations of formative matter change and sometimes fail entirely. The mold breaks:

Inheritance must be looked at as merely a form of growth. . . . Each animal and plant may be compared to a bed of mould full of seeds, most of which soon germinate, some lie for a period dormant, whilst others perish. . . . Each living creature must be looked at as a microcosm—a little universe, formed of a host of self-propagating organisms.\(^{11}\)

This vision is radical, and unsettling. The organism’s perfect integration of part and whole is exchanged for a messier, wasteful ecology, a “bed of mould” or soil, in which some things survive and some don’t. Inheritance is reimagined as an insistently ecological “form of growth,” constantly interacting, constantly in flux. In trading mold for mould, Darwin asks us to imagine we are simply a portion of our environment, no more organized and no more handsome than any seedy bit of ground.

Darwin spent the rest of his career trying to work through the implications of this radically relational ecology, with its thorough demolition of organic form and progressive development, including it in later editions of *On the Origin of Species*. In 1872, he added an extended comment on the nature of organic form:

With organic beings we should bear in mind that the form of each depends on an infinitude of complex relations . . . on the nature of the variations which have been preserved or selected, and this depends on the surrounding physical conditions, and in a still higher degree on the surrounding organisms with which each being has come into competition,—and lastly, on inheritance (in itself a fluctuating element) from innumerable progenitors, *all of which have had their forms determined through equally complex relations*.\(^{12}\)

All seemingly organic beings, in this account, are buzzing congeries of forms, of an intricate series of relations, internal and external, to other

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beings and to the wider world—in essence, a sum of accidents. To read
them is to read for that wider set of relations, to interpret the contexts that
are pertinent to them, and their connection to other forms, within and be-

On the Origin of Species dodges the implications of this new ontology for
human societies and contemporary debates over the biological status of hu-
man races. His final treatment of this question, The Descent of Man (1871),
remains his most controversial book. Periodically marked by racist, misog-
ynist, and imperialist judgments, it remains a flashpoint for critiques of
Darwin, the toxic possibilities of his thought, and his place in the genealogy
of nineteenth- and twentieth-century racial science and genocide. Sylvia
Wynter’s analysis of the central role race plays in biocentric modernity is
a major example. Over more than a dozen extended essays and interviews,
she engages extensively with Darwin, Darwinism, and neo-Darwinian par-
adigms on at least three explicit levels: taking Darwin as a consequential the-
orist of the biological nature of humanity; as the progenitor of Darwinist the-
ories of race and gender; and as a philosophical model for imagining new
ways to read human history and its future. The first two center on the “con-
tradiction at the heart of the Darwinian Revolution . . . on the one hand, the
continuing dazzling successes of the biological sciences [with a now secular-
ized understanding of the biological dimension of human existence] and, on
the other, . . . the obsessive ethno-biological beliefs in the genetic inferiority
of nonwhite natives,” as elaborated in Wynter’s distinct readings of On the
Origin of Species and The Descent of Man. Yet from a wider perspective, her
consistent adoption of evolutionary theories of anthropology and psychol-
ogy, as well as complexity theory (marked in her continuing references to
works by Gregory Bateson, Richard Dawkins, Heinz Pagel, and Gerald Ed-
elman) mark her own contributions as a theorist of human evolution (very
much on Darwin’s model).

To these explicit engagements with Darwin, I would add a fourth, sub-
terranean and perhaps more consequential, relation: Darwin’s lasting in-
fluence as a critical process philosopher. The Descent of Man marked Darwin’s
most sustained attempt to give human evolution, aesthetics, and cultural

13. This description of form, Henry Turner notes, “describes a ragged unity, at many scales: it
is the unity of a cloud, not that of a stone or of a set” (Henry Turner, “Lessons from Literature for
the Historian of Science [and Vice Versa]: Reflections on ‘Form,’” Isis 101 [Sept. 2010]: 586).
15. Wynter describes these evolutionary proposals as “meta-Darwinian” (Wynter, “The Cer-
emony Found: Towards the Autopoietic Turn/Overtur, its Autonomy of Human Agency and
Extraterritoriality of [Self-]Cognition,” in Black Knowledges/Black Struggles: Essays in Critical
forms a thoroughly ecological reading. This extended and consequential reading of culture as changeful and erratic develops, in Wynter’s terms, a consequential interpretation of the “human as praxis.”

Darwin’s treatment of race is especially critical. He opens his chapter “On the Races of Man” by immediately translating race into the language of form:

It is not my intention here to describe the several so-called races of men; but to inquire what is the value of the differences between them under a classificatory point of view, and how they have originated. In determining whether two or more allied forms ought to be ranked as species or varieties, naturalists are practically guided by the following considerations; namely, the amount of difference between them, and whether such differences relate to few or many points of structure, and whether they are of physiological importance; but more especially whether they are constant.

The pivot from races to forms here allows Darwin to reinterpret races as loosely related collections of features, or component forms, rather than unified systems of distinction. Carefully sifting the handful of superficial traits considered diagnostic by contemporary racial taxonomists and the many more traits that do not in fact vary, Darwin ultimately concludes that such differences are, in fact, “few,” of little “physiological importance,” and far from “constant.” In this way, Darwin used the ecology of form to explain why race was neither an essential feature of human populations nor a valid biological category. As Kwame Appiah explains this, Darwin’s account precipitated a radical shift away from theories of “racial essence” and so made a critical contribution to the dismantling of racist science.

2. Racial Ecologies

Darwin was not the first modern theorist to think about form in terms of living processes and environmental engagement, and a review of those alternative accounts and their contributions to racist science can set the possibilities of his ecological thought into relief. The eighteenth century hosted raging debates over the nature of organic form, the source of its order, and

its relation to the environment. Preformation held that all future biological forms are prepackaged within the ancestral line and that biological growth is simply the expansion of this engrained design. Epigenesis, by contrast, followed Aristotle in arguing that generation is a process through which organic form is impressed on matter by parents (hence, epi-genesis, generation upon or from without something).\(^\text{19}\) Though they disagreed on the precise mechanism, enlightenment epigenesists generally interpreted organic form as the expression of a power that molds creatures from within, rather than impressed structure. George-Louis Leclerc, Comte de Buffon, for example, argued that parents impart a moule intérieur or “internal mold” to their offspring, describing it as a force, “analogous” to gravity, that acted continuously on organic structures.\(^\text{20}\) The interior mold was central to Buffon’s analysis because it explained how, even as individual members of a species showed a multitude of differences, the essential nature of the species would be preserved over time.\(^\text{21}\) Immanuel Kant closely followed Buffon, explaining the formal stability of species as a regulative organic force or “original predisposition” imparted in the offspring.\(^\text{22}\) Kant made this principle of inbuilt formal regulation central to his account of human races, arguing that distinctions between different human populations did not reflect the unmediated influence of environment so much as the ability of different conditions to draw out the “original predispositions” of the human species, a “solicitude of nature to equip her creatures through hidden inner measures for all possible


20. Paul Farber, “Buffon and the Concept of Species,” *Journal of the History of Biology* 5 (Fall 1972): 253, 264. This is Farber’s detailed review of the relation between Buffon’s reproductive species definition and the “moule intérieur.”


future circumstances” by analogy with the apparent adaptation of plant and animal populations to their environment. This teleological analysis secured a close identification between environment and the stability of human races; Kant speculated that those same predispositions would ensure that races would become fixed over time: “once a race has established itself as the result of a long residency of its ancestral people . . . no further climatic influences could cause it to change into another race.”

Eighteenth-century epigenetics translated Aristotelian hylomorphism as a regulative force that ensures stability despite degrees of change. This interpretation of the regulative principle behind organic form was widely influential in later accounts, persisting in morphological studies that sought unifying models of development behind the variety of species and their forms. So, in Johann Wolfgang von Goethe’s *Metamorphosis of Plants* (1790)—which had an extraordinary influence on German idealism, especially by way of Hegelian philosophy—organic development is explained as the progressive unfolding of a central idea or archetype. In the process by which the seed develops into roots, stems, and leaves, Goethe describes a stadial development in which even apparently retrogressive steps prepare the *Aufhebung* of a transcendent new transformation, especially evident in the formation of the flower and fruit. It is important to note that Goethe sets aside the incidental influence of other creatures in the environment, while emphasizing how consistent material elements of the environment, like air or water, impinge and draw out the archetypal form. In Goethe’s morphology, Aristotel’s epigenesis is effectively divided into two collaborative processes, the inbuilt


formal drive of the organism and its providential interaction with its sur-
round, each revealed continuously in rhythms of growth, interaction, and
transformation—cycles of thesis, antithesis, and synthesis adopted by Hegel’s
dialectic.  

The formal stabilization of organic vitalism played a consequential role
in arguments over human races and their biological distinction in the nine-
teenth century, furnishing a mechanism for the persistence of essential ra-
cial difference despite evidence of relation and change over time. In Die
Natürliche Schöpfungsgeschichte (The History of Creation, 1868), Ernst Haeckel
produced a tree that progressively ranked dozens of putative human races. Such
trees demonstrated, according to Haeckel, the general applicability of
Goethe’s approach, in which the naturalist looks beneath the diversity of ex-
tant types, in search of the “einfache Grundform” (essential grounding form)
from which different groups develop.  

If, as Zakiyyah Iman Jackson explains, Haeckel’s studies demonstrate how
the “pursuit of an observable and comparative basis of racial taxonomy” or-
ganized contemporary science, they also illustrate how organic conceptions
of racial integrity shaped the new science of ecology. Ernst Haeckel coined
the term ecology in 1866, defining it as “the whole science of the relations
of the organism to the environment including, in the broad sense, all the ‘con-
ditions of existence.’” In ecology, Haeckel drew specific attention to the root
term, oikos, which he defined as “household or housekeeping, living rela-
tions.” In doing so, Haeckel aligned ecological homemaking with his anal-
ysis of the progressive organic development of both species and human races.
A subsequent generation of ecologists, notably Frederic Clements and John
Phillips, translated Haeckel’s homemaking into invasive homesteading.
Working in settler colonial spaces (the American Southwest and South Af-
rica) they articulated this rapacious “ecesis” as a process through which any

28. See Fürster, The Twenty-Five Years of Philosophy, pp. 273–302. A hundred years on,
D’Arcy Wentworth Thompson similarly explained organic form through the providential action
of mechanical forces within biological systems, and the relation to Aristotelian epigenesis is evi-
dent throughout; see D’Arcy Wentworth Thompson, On Growth and Form (Cambridge, 1917),
pp. 653–60.
29. See Richards, “Ernst Haeckel’s Alleged Anti-Semitism and Contributions to Nazi Biol-
30. Ernst Haeckel, Die Natürliche Schöpfungsgeschichte Gemeinverständliche Wissenschaftliche
Vorträge (Berlin, 1870), p. 75. See the discussion in Benoît Dayrat, “The Roots of Phylogeny:
31. Zakiyyah Iman Jackson, Becoming Human: Matter and Meaning in an Antiblack World
32. Quoted in Robert C. Stauffer, “Haeckel, Darwin, and Ecology,” The Quarterly Review of
Biology 32, no. 2 (1957): 140.
33. Ibid.
entity—from a species to a society—made its “special identity” or “destiny” manifest, treating environments and Indigenous peoples as instruments of that fulfillment.35

There is a clear racial and imperial inflection to this ecological thought, imagined through the lens of a white colonizing subject whose environment is produced through genocide—the “possessive investment” of what Curtis Marez terms “white ecology.”36 Ecocriticism is already beginning to take this history into account, exploring the “slow violence”37 of environmental racism, studying Indigenous and non-Western relations to land management, and tracing the conformation of “racial identities and ecological space and place” in what Leilani Nishime and Kim D. Hester Williams term racial ecologies.38 White ecology threads through strands of ecological thought that define the environment in terms of its utility to a centered subject, whether in the intimate relation Jacob von Uexküll proposed between the aufbau (essential plan) of an organism and its surroundings or the interpretation of environment in terms of Gibsonian affordance.39 Even as they deploy the vocabulary of ecology, such accounts forestall the possibility of a truly “relational ecology,” as Stephen Nathan Haymes explains.40 As a recent example, white ecology persists (by way of Gibson) in the opening example of Jonathan Kramnick’s Paper Minds: Literature and the Ecology of Consciousness, which locates, within the house-making scene of Robinson Crusoe, a homely articulation of “perceptual ecology” in which the colonial environment is drawn comfortingly into Crusoe’s domestic reach.41 But how does Man Friday fit

into Crusoe’s ecosis? In asking, I underline how the domesticating impulse of settler colonialism continues to shape the ecological imagination.

How might Darwin contribute to what Achille Mbembe and others have called the decolonization of knowledge, especially the decolonization of ecological thought? Darwin’s theories, like his science, were powered by environmental devastation and the acquisitive regimes of imperial collection. Any attempt to revive his ecology as a way to think of social power and human violence in nondeterminist terms must confront this history. The continuing impacts of social Darwinism, racist science, and eugenics leave much work to do in rescuing Darwin’s concept of ecology from the racist and imperialist interpreters who followed, especially if it is to be activated as a resource for social thought.

3. Ecologies of Relation

Yet Darwin’s philosophy continues to resonate, in part, because it fatally undermined four key elements of racist ecology: organic form, providential development, racial fixity, and environment as resource. It is time to rewild or, better, decolonize Darwin’s ecology. Wynter was first to read Glissant’s philosophy as a response to a “Darwinist discourse of ‘race.’” And Glissant continues to offer a way to read Darwin’s ecology of form against that history, a way of reading the legacies of colonial violence and discrimination critically while opening up alternative possibilities. Reciprocally, Darwin’s philosophy helps to underline the empirical commitments of the explicitly “ecological vision” of Glissant’s Poetics of Relation (p. 146). Read in dialogue, Glissant’s decolonized ecology powerfully formalizes Darwin’s complex studies of inheritance, modification, and interaction as a more basic interplay of relation and difference.


43. The ostrich-like rhea of South America, which Darwin extensively hunted during his Beagle voyage, is one example; the Argentine naturalist W. H. Hudson later railed: “He may scorn the horse and his rider, what time he lifts himself up, but the cowardly and murderous methods of science, and a systematic war of extermination, have left him no chance” (W. H. Hudson, The Naturalist in La Plata, in The Collected Works of W. H. Hudson, 24 vols. [New York, 1892], 19:28).

44. Darwin, in Elizabeth Grosz’s account, similarly “provides feminist and cultural theory with a way of reconceptualizing the relations between the natural and the social, between the biological and the cultural, outside the dichotomous structure in which these terms are currently enmeshed” (Grosz, The Nick of Time, p. 91). Donna Haraway invokes Darwin in parallel fashion, for his “capacity to tell big-enough stories without determinism, teleology, and plan” (Haraway, Staying with the Trouble, p. 50).

In a long chapter of the *Poetics of Relation*, Glissant teases out the basic tension between dominance and cooperation in social relations and weighs their implications in the history of languages, cultures, and land use. Poetry, he suggests, is one means by which we might cultivate this understanding and a new “aesthetics of the earth” (*P*, p. 148). He closes its discussion with an evocative, poetic proposition, a patterned language tuned to ecology: “Les écarts sont nécessaires à la Relation, et ils en sont tributaires— / comme l’olivier de mer pour le mancenillier [Differences are necessary to Relation, and they are dependent on it: / as the sea olive to the manchineel].”*46* I want to call attention to what is lost in my translation. *Les écarts* are not just differences but also distances (*écarter* means to separate, pull apart), which allows them to function both as a sign of difference in general but also points to the territorial differences at stake in this particular analogy. Similarly, *tributaire* in French, like its English cognate, can refer to riverine tributaries but has roots in the Latin word for *tribute*, a territorial relation of subjection, recalling both the marine situation and colonial history. All of these semantic resonances load tension into this dialectic of reciprocity, the threat that balance will shade into domination. Elsewhere, Glissant defines relation as “the repercussions of cultures, whether in symbiosis or conflict . . . in domination or liberation” (*P*, p. 131). This tension between giving-with (*donner-avec*) and taking into one (*comprendre*) lends ecology a critical force in social analysis, accentuating the constitutive tension between cooperation and competition, between symbiosis and domination, that runs through all of Darwin’s ecological accounts (see *P*, pp. 142, 141).

Glissant’s relation is *ecological*, always a situation of wider interplay, of an interaction between systems of relation.*47* This tension—geographic, political, energetic—establishes what is at stake in the ecological comparison to the sea olive (*Bontia daphnoides*) and manchineel (*Hippomane mancinella*). Both are small fruiting plants native to the Caribbean. The former is cultivated as a decorative planting, but the latter is notoriously poisonous; it was even recorded, in a Martinican herbarium, that the one could be used to cure the other.*48* Their poetics of relation is complicated, resonating between various perspectives, etymological and semantic, ecological and biosocial. This resonance, a reverberating repetition and relation, opens them to a wider ecology of meaning and literary reference. Glissant, with his poet’s ear, was alive to these resonances and intensified them. These echoes invoke Glissant’s

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situation within creolization and Francophone Antillanité: the tension inherent in writing as a Martinican philosopher and poet, with the legacies of a colonial language. Closing his chapter, he set these lines apart with a blank line, amplifying their medial caesura and enjambment: an Alexandrine resonates within them, invoking the epic in its quintessentially imperial verse form. Any form, by virtue of its repetition, its history, embeds a kind of knowledge about the world, a statement of what the pattern has been and the question of what it will be. Forms embed histories and open to futures.

4. Wave Form

The first task of ecopoetics is to break out of the container form and set aside the notion of form as something that contains something else, form as over and against content. Instead, think of form as the interface or relation between a content and an extant. To speak of form as a relation between content and extant is to emphasize the fact that form, rather than determining content, marks a productive relation, something that happens as an ecological interaction between at least two things—what Karen Barad calls their “intra-action.”49 This turn from materialism and inbuilt design toward relation and interaction distinguishes the ecology of form and recent strands of new formalism.50

Art historians have long appreciated this formative interaction between content and extant but also the key role of repetition.51 Forms both repeat and change, they are never precisely the same, and they are never singular: there is no unique form. Form is produced in the iteration of relations, in eventfulness.52 All of those features we generally assign to forms, including their self-similarity, mobility, and capacity to produce specific modes of encounter, are actually features of collective interaction, events repeatedly

50. This essay draws significant inspiration from Caroline Levine’s Forms: Whole, Rhythm, Hierarchy, Network (Princeton, N.J., 2015), even as it replaces that study’s use of Gibsonian affordance with a more fully ecological account of form’s material society.
51. For a recent reading of Focillon and the other “inessential” theories of form formulated within art history, see S. Pearl Brilmyer and Filippo Trentin, “Toward an Inessential Theory of Form: Ruskin, Warburg, Focillon,” Criticism 61 (Fall 2019): 485–508. Henri Focillon explains that the work of art “treats space according to its own need, defines space and even creates such space as may be necessary to it” (Henri Focillon, The Life of Forms in Art [New York, 2013], p. 65). T. J. Clark posits that “form is controlled repetition,” a “way of capturing nature’s repetitiveness and making it human” (T. J. Clark, “More Theses on Feuerbach,” Representations 104 (Fall 2008): 7, 4).
produced and reproduced by the interaction of things in the world, from material substrates to natural agents to people.

To read complex ecologies of form, within Glissant’s “flood of convergences,” it has helped me to develop more schematic formulations (P, p. 45). The first:

(1) **Form is relation (of content and extant) plus repetition (F = R + R).**

As a reading practice, the ecology of form continually asks two questions: **What does the form bring into relation** (what are its pertinent contents and extants)? And **what does the form repeat** (what is its history, what does it bring to the present, what does it echo or duplicate)? It is a question of the relations between the things and the world—the contents and the extants—and their place in a wider network of examples, echoes, and repetitions.

How are we to read the action of that convergence, the manner in which forms engage each other? An intriguing feature of Caroline Levine’s material formalism, which this essay responds to, is its concern for how forms sometimes “collide” and at other times are “superimposed.” Imagined as physical artifacts, in the mold of Aristotle, it’s intuitive to think about how forms bang into each other and how they might cover one another up—how they *compete* for the same space. But how do forms *reinforce* each other? How might they occupy the same space, the same impulse, without displacement? How is it that so many different forms, syntactic and social, phonemic and conceptual, can interact within a single sentence? If we think of form less as a thing than as an *interface* between a content and an extant—as something like a wave—another possibility rises.

The mathematical concept of wave *superposition* provides one suggestive way to think about how forms interact without displacing each other. As Karen Barad explains, “waves are not entities but disturbances extended in space,” and this is one reason that waves can combine, can add up without displacing each other (M, p. 255). This combination can *amplify* the specific patterns in each wave but also reduce it: out of sync waves *interfere* (fig. 2). There is no collision, no above or below in *super* position; component waves combine and interact. Superposition might more accurately be described as com-position: placement together, or being-with. And because waves add up, any complex wave can be broken down, analyzed into component wave forms. Such layering suggests also why there is so much debate over the scale and place of form: whether it applies equally to categories like trope or genre or social custom; whether it is an exclusive feature of human activities or an aspect of the wider world.

The interplay of wave forms has helped me think about the relational mode of this article, which draws from Black and feminist science studies in aligning different theoretical perspectives, writers, and problems. Barad identifies this as a “diffractive methodology [that] is respectful of the entanglement of ideas and other materials” (M, p. 29), while Tiffany Lethabo King describes it as encounter through “assembling, shoaling, and rubbing disparate texts against one another.” Superposition also offers a new formal model for the intersectionality that Kimberlé Williams Crenshaw identifies between systems of power and discrimination, including race, gender, and class. The composition of waveforms at various levels of scale, and the ability of waveforms operating at different scales to interact, provides a fluid understanding of critical, social, and formal interplay.

56. So, André Jolles argues that complex forms, like architectural styles or literary genres, are built of the interplay of more basic, simple forms; see André Jolles, *Simple Forms: Legend, Saga, Myth, Riddle, Saying, Case, Memorabile, Fairytale, Joke*, trans. Peter J. Schwartz (New York, 2017).
In addition to asking, what does this form bring into relation and what does it repeat, the ecology of form asks: How do other forms amplify it? How do they interfere?

(2) *Superposed forms amplify and interfere* \((F + F = A + I)\).

Wave forms are social, as much as physical phenomena. A classic example is given in historical data on Canadian hare and lynx populations (fig. 3). This chart is a set piece in ecology textbooks, exemplifying how oscillations in predator populations follow undulations in the prey they feed upon—or seem to. The original version of this chart combined various incomplete series of data, including the Hudson Bay Company’s pelt records and astronomical records of sunspot cycles.\(^{57}\) A later reanalysis of the regional data showed that the cyclical periods of the two curves do not, in fact, align like this; for some periods and locations, the increases in the lynx population *preceded* the hare—violating the classic predator-prey relation.\(^{58}\) The likely reason is that the chart didn’t track two isolated life forms but rather an ecology impelled by intersecting rhythms, including Indigenous environmental management and the Hudson Bay Company’s roving trappers. All of these systems of relation amplified and interfered with the hare and lynx populations in complex ways. Such wave forms are social through and through, subsisting at the intersection of various agents and through the composition of other social forms, from the interacting populations of animals to the rhythms of global trade.

The physical sciences and the laboratory environment have often had pride of place in the philosophy and sociology of science, especially in the turn to interactionist and performative accounts of science and the *dance of agencies* between scientific objects and observers.\(^{59}\) But before Niels Bohr’s physics, Darwin’s ecology explored what it meant to be a “part of that nature that we seek to understand” \((M, p. 67)\). In turning from shapely matter to sociable form and from physics to ecology, I seek an ecological mode of relational analysis that can—in its focus on power, violence, and history, as well as shared agency—overcome some of the criticisms of new materialism and

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With Anna Tsing, ecology interests me because its central question, “how the varied species in a species assemblage influence each other . . . is never settled: some thwart (or eat) each other; others work to make life possible; still others just happen to find themselves in the same place.” Ecology turns our attention from the immediate complication of observer and observed to a wider play of encounters, social interactions, and relations of power, including those beyond the human. This is one way to read the formal implications of Christina Sharpe’s description of “the wake,” as “slavery’s as yet unresolved unfolding” in American life. Sharpe calls us to care for this relation between past and present, to practice a kind of “wake work” attuned to the past and its effects, to “think about the dead and about our relations to them” (I, p. 21). The compositionality of form can help think not only about the human lives that were absorbed by the rhythms of slavery and the capital they built but also how the impulse of those lives—in their forced labor but also their resistances, in the multiplicity and variety of their actions—remain embedded in the physical environment

60. To take an example, Andrea Whittle and André Spicer argue that actor network theory is not critical: it *naturalizes* descriptions of behavior rather than “recognizing that the way things are is neither natural nor inevitable,” it is *unreflective* rather than “recognizing the role of the analyst in the construction of knowledge,” and it is *performative*, reflecting a “means-end rationality that reinforces existing relations” rather than “considering possibilities for new forms of social order” (Andrea Whittle and André Spicer, “Is Actor Network Theory Critique?” *Organization Studies* 29, no. 4 [2008]: 612).


and in the life of the nations they shaped. These histories continue to unfold in
the intimate relation, traced by David N. Pellow, between social inequality,
environmental harm, and ecological justice.\textsuperscript{63}

The final question the ecology of form asks: Does this form support re-
lations of harm or care (or is it effectively indifferent)?

(3) \textit{Form affects life through harm and care} (\textit{F} + \textit{L} = \textit{H} + \textit{C}).

5. Racing “Dover Beach”

A wave is a tangible formal phenomenon that puts us in touch with wider
actions. Waves are composed of many forms, including life-forms. The shoal
where a wave forms, as King explains, is an ecology.\textsuperscript{64} When we are lifted by a
wave near the shore, we are engaged in its life, part of the relations it patterns
and the power it delivers.

The day after the US election in 2016, as I walked into a general education
seminar, I struggled to imagine how the election of a racist and boastful sex-
ual predator would affect my students, who had voted for the first time. The
final stanza of Arnold’s poem “Dover Beach” kept rolling through my mind.
It exhorts: “Ah, love, let us be true / To one another!”\textsuperscript{65} And so I asked my
students, how can we wake “Dover Beach”? How can we sit with its continu-
ing reverberations, become attuned to what it transmits, including the his-
tories of violence, dispossession, and the kind of white fear that powered that
wave election?

Any reading must confront the insistent connection the poem draws be-
tween the ocean and the social world. I’m swept by the briny line in which the
rolling waves “Begin, and cease, and then again begin” to beat the beach, be-
cause the language so powerfully evokes the stuttering cadence of waves on
sand through a verse experience that is seen, heard, and felt (“\textit{D},” p. 112).
This sound is an effect of overlapping forms, functions of meter, the stress
pattern, the syntax, the caesuras and punctuation, assonance and dissonance,
the withdrawing hiss of “cease,” the plosive \textit{g}\’s over which the line and its
waves accelerate and break. It’s the kind of seemingly irregular rhythm or
\textit{tremulous cadence} that, as Stefan Helmreich notes, oceanographers struggled
to explain before adopting wave function analysis.\textsuperscript{66} When we analyze a poem

\textsuperscript{63.} See David N. Pellow, “Toward a Critical Environmental Justice Studies: Black Lives

\textsuperscript{64.} See King, \textit{The Black Shoals}, p. 3.

\textsuperscript{65.} Matthew Arnold, “Dover Beach,” in \textit{New Poems} (London, 1867), p. 113; hereafter abbre-
viated “\textit{D}.”

\textsuperscript{66.} See Stefan Helmreich, “Old Waves, New Waves: Changing Objects in Physical Oceanog-
raphy,” in \textit{Fluid Frontiers: New Currents in Marine Environmental History}, ed. John Gillis and
like this, we decompose it into the more basic formal relations—relations both internal and to the wider world—and study how these different functions combine, overlap, reverberate, reinforce, and counterpoise. The layering of these relations extends across many levels, from the contours and gradations of the print on the page to the semantic interactions of the words, from the play of light on paper to the wash of sound that fills our ears and the impulses that roll through our heads.

Within this experience, how might we tease out the poem’s alert historical reverberation, the way the echoing sea sings, according to the poet, of other times? A critical problem for understanding “Dover Beach” is the joinery between its two main movements. The first several sections discuss the beach at Dover and its relation to other seas; but the last section, written some time earlier, dives into martial Greek history. What connects the Dover straits, where the “moon lies fair,” and the ancient “darkling plain” on which “ignorant armies clash by night” (“D,” pp. 112, 114)? Those final lines allude to Thucydides’s History of the Peloponnesian War, a favorite of Arnold’s father, who published an annotated edition and engrained it in Arnold’s memory. In particular, the lines refer to a disastrous battle. In an attempt to surprise the Syracusan army, a Greek general ordered a nearly unprecedented night attack, and after the first wave of the assault broke against the Syracusan defenses, the Athenian army was confused and began to slaughter each other.

The defending Syracusans, Thucydides explains, shared the same basic culture: the same dialect of Greek, allied forms of worship, and (most important) the same musical key for their battle songs, the Dorian mode—in effect, a coherent set of rules for the successful composition of forms. The invading Greek army, by contrast, combined Ionian and Dorian soldiers, the latter drawn from tributary states that were part of the Peloponnesian peninsula, as well as mercenaries and slaves. As Arnold’s father elaborates in his introduction, musical modes (here, Dorian and Ionian) organized the fundamental relations of ancient life, above all, the collective social customs that, in his account, defined “races” in the ancient world. The night attack, which decoupled war from the diurnal cycle, had unintended effects: muting the visual tokens of alliance; tilting the aesthetic ecology of the battle field from sight to sound; magnifying, in effect, the interfering tonalities of Dorian and Ionian hymns. In the bewildering light, the invading army listened to the differing songs of their own allies and heard the clash of alien music, of interfering forms. As the poem puts it, the “alarms”

were “confused” (“D,” p. 114). The maddened armies of Athens smashed themselves to pieces.

What connection does the poet want us to draw, to care for here? When the poet hears an “eternal note of sadness” (“D,” p. 112) in the waves at Dover, he asks us to register how forms record a longer history through which difference is organized into violence. Yet the reference to the violent collapse of the Greek empire, read by Arnold and his father through the lens of racial interference, crystallizes the significance of Arnold’s own marriage (he composed part of the poem during his honeymoon at Dover) as a facet of the racial union that constituted England and the Saxon and Celtic “essences” that, as Appiah explains, underwrote his conception of Englishness. To stay true here is to stay oriented, to cleave together or, like the white cliffs of Dover, risk being cloven apart by a blackening nighttime sea. To be true is to incorporate nationalism, as Pheng Cheah explains it, “as a form of self-recursive mediation, an organic prosthesis of the living national body.”

In the mode of Glissant’s taking into one, it superposes heterosexual marriage, reproductive futurity, racial fidelity, and nation into a singular relation of care for the English, with indifference or harm to others. It is a plea to keep the lights on and consummate whiteness.

6. White Formations

Insofar as waves mark the collective transmission of power, they also call attention to the power of forms—the energies that produce and sustain them. Forms are powerful because of the energies they gather and focus, whether human or fossil; they transfer energies and have long reverberating effects. And insofar as forms embed history, we may also read the complex histories of their power.

Helen Oyeyemi provides a powerful reading of the compaction of the whiteness and xenophobia at Dover in her novel White Is for Witching. Set (mostly) in the modern day, it centers on a house that stands near the white cliffs and on the four generations of women who have inhabited it, using these figures to tell a much deeper history of the racial violence in the United Kingdom and its former empire. It is also a formal meditation on the capacity of gothic fiction to excavate the violent legacies of history and the way these legacies are woven into the land and its built environments as much as the lives of people.

The narrative of White Is for Witching circles around the disappearance of pale Miranda Silver, who suffers from pica, a compulsion to eat nonfood

68. Appiah, “Race, Culture, Identity,” p. 82.

items. Miranda prefers chalk. When he wrote “Dover Beach,” Arnold did not know that its white-chalk cliffs were made from the calcium shells of coccolithophores, white formations, redolent of English identity, produced from trillions of tons of compressed marine skeletons. Arnold’s poem laments how this towering symbol is torn away by the sea, but Oyeyemi reads it as a structuring metaphor for historical sedimentation and the way England and its whiteness built up over time. In the end, Miranda’s body (like those of her mother, grandmother, and violently racist great grandmother) is deposited beneath the house, superposed on her maternal line, pressed into a history of xenophobia, racial violence, colonial, and postcolonial exploitation.70 The wider point is that a formation like whiteness, with its seemingly monolithic power, is built up from a trillion acts of violence and exclusion, including (as Miranda’s namesake alongside numerous references to nineteenth-century literature suggest) the violence of literature. Such patterns sediment over time, compressed into the architectonic structure of modernity.

But even if Miranda’s plot demonstrates, as Oyeyemi has put it, that “there’s no escape” from the story of white supremacy, other characters show, through their distinct relations to that story, that its hold is not monolithic, that the lives lost in its violence can be excavated, brought to attention and care.71 These alternative relations are amplified in the narratives of Miranda’s housekeeper, Sade, and Ore Lind, Miranda’s girlfriend. As naturalized Nigerian immigrants, like Oyeyemi herself, they bring a critical perspective that interferes with the power that haunts the Silver house. Sade and Ore’s status as immigrants also sets the contents of the house in relation to the novel’s extants—its extensive engagement with the immediate history of the refugee and immigrant crisis. Set at the turn of the millennium, amid a swell of anti-immigrant sentiment in England, the novel circles a historic incident. When they hear that fifty-eight Chinese immigrants have been found in the port, suffocated within a truck container, Miranda asks: “What is wrong with Dover?”72

Sade’s cryptic response: it is the key to England.73 The deaths of the Chinese immigrants (with the exception of the Lockerbie bombing, the largest

70. Reversing the impulse through which, as Kathryn Yusoff explains, “Whiteness (as a formation of power) gets to ‘choose’ environmental conditions” (Kathryn Yusoff, A Billion Back Anthropocenes or None [Minneapolis, 2018], p. 55).
mass murder in recent British history) alongside further references to anti- immigrant violence serve as the novel’s historical correlative. The Dover container disaster rallied both humanitarian efforts to improve Britain’s policy toward immigrants and far-right activists who demanded the government keep “England for the English” by closing immigration. Outcry over the tragedy precipitated the creation of Dover’s Immigrant Removal Center, a facility that, in the name of giving illegal immigrants “humane accommodation,” locked them into a former prison. Oyeyemi, who studied social policy at Cambridge University, explores the relation between the segregating logic of the detention center and the house itself, which attempts to cordon “incomers” from its white owners by either driving them out or digesting them. Her strategic use of the gothic, and especially vampire narratives, interrogates these waves of predatory violence as what Sharpe calls the “past that is not past” (I, p. 9). The novel continually interrogates and opens up such containments to their wider relations. Sharpe, posing a similar question about the place of shipping containers in the international refugee crisis, asks, “How are they connected to the containerization of people prior to and during and then after that perilous sea voyage?” (I, p. 29). Sharpe’s point, as I read it, is that containers do not enclose but instead open ecologies of relation, including predation. Containers superpose itineraries and histories.

As Nigerian immigrants, Ore and Sade reflect the convergence of two distinct waves of emigration. Like Oyeyemi herself, Ore is born of a spike of Nigerian immigration in the 1980s that followed the collapse of the world oil market, which disproportionately impacted the salaries of white-collar workers. Sade, by contrast, seems to come from a more rural Yoruba community, the backbone of Nigerian agriculture, and a longer swell of immigration that responded to both the political and economic turmoil that succeeded Nigerian independence and the mounting costs of pollution and climate

76. Oyeyemi, White Is for Witching, p. 137.
78. The immigrants who died in the truck container at Dover, like the thirty-nine smothered Vietnamese immigrants discovered in a similar container in 2019, traveled through the same Dutch port on their way to England; see Irish Central Staff, “UK Lorry Tragedy: NI Suspect Allegedly Involved in Other Trafficking Incidents,” Irish Central, 5 Feb. 2020, www.irishcentral.com/news/eamonn-harrison-trafficking
The harm to Yoruba agriculture caused by Nigeria’s oil industry after 1970 was not singly mediated by the earth system through global warming and desertification: oil extraction and the flaring of waste gas lead directly to local heat pollution and acidification of the rain and soil.

Between Ore and Sade, an émigré impelled by shocks in the global petroleum industry, and a climate refugee whose relation to nature has been displaced, one might see the opposition recently sharpened by Dipesh Chakrabarty between the “global” regime of capital and the “planetary” perspective of the earth system. Chakrabarty remains skeptical of the impact of “debates on issues like climate justice, climate refugees and their rights, democracy and global warming,” insofar as their “ideal forms” are restricted to the conceptual “domain” of the global. By contrast, the ecology of form reads domains, whether global or planetary, as forms that are not discrete, integral, organic formations but rather ensembles of practices, of component forms that amplify and interfere in complex ways, and so, traffic with different patterns of thought, drawing them into relation.

Finally, the ecology of form suggests why there are no ideal forms; forms are worldly, existing through material relations and in natural-social ensembles that do as much to undermine hard distinctions between the planetary and the global as between natural and human history. The present crisis of both human and nonhuman flourishing—whether described as the Anthropocene, Capitalocene, or Plantationocene—demands not so much a new philosophical anthropology as a renewed philosophical ecology that looks backward as much as forward and that does not so much carve out an exception for human values as place them in relation to forms of value beyond (and not simply for) the human.

82. Ibid., pp. 24–25, 28.