

Cells and Cities: The Neo-vitalist Impulse in Contemporary Urbanism

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INTRODUCTION

In 2012, *Why Factory*, a research spin-off of the Dutch architecture office MVRDV, presented a speculative vision for Amsterdam, *The Wild City*. “The rusting cars enrich the soil with iron, helping the growth of seeds of wild apple trees,” stated a speech balloon attributed to a rusting car in a meticulous line drawing.¹ The vision was part of a comprehensive research program Biodiversity, which explored the urban condition of biodiversity. A simultaneously developed scenario reintroduced wetlands into the ruins of the ill-reputed Bijlmermeer housing estate. Other urban projects of the MVRDV also elaborated on the symbiosis, collaboration and cohabitation between people, plants, animals, as well as soils, waste and bacteria. The architects claimed to draw upon “Deleuze and Guattari’s thought that the opposition between humans and nature does not exist”² and articulated a design program that “regarding nature, often the best we can do is to do nothing ... [and] create a hidden urbanism that gives priority to nature.”³

Rather than taking this purported retreat from design at face value, I will analyze the process of reinventing urbanism as a strategy that seeks to facilitate the emergent self-organization of nature.⁴ It would be insufficient to interpret the championing of nature by urbanism as its “greening” pure and simple. Instead we should see in it a more fundamental metaphysical, ethical, and aesthetic turn towards the biological problematic of life. Biomimetic urbanism, or biourbanism, foregrounds

biological morphogenesis as a design principle. It is an environmental type of action that strives to optimize conditions within which life can thrive.

To unravel biourbanism’s ambiguous political ramifications it is necessary to examine its relation to vitalist and post-humanist epistemologies such as the Anthropocene. *How* have designers operationalized the argument about destabilized human-nature boundaries, and to *what ends* have they put it? I will approach these questions by revisiting, albeit in an undoubtedly simplistic way, two key “episodes” in the history of urbanism. The problematization of biological life under capitalist urbanization (miasma theory, sanitary legislation) were key factors in the birth of town planning and modern urbanism in the decades around 1900. Even as variants of urban organicism drew its putative models from nature, the plan and the form were terms in which the life of urban populations was to be

1 From a drawing online at <http://the-whyfactory.com/wp-content/uploads/2012/01/pages-from-wild-city.jpg>.

2 “Biodiversity: How Can We Co-exist with Animals?” The Why Factory, <http://the-whyfactory.com/project/biodiversity>.

3 Marta Pozo Gil, “Wild City. MVRDV: Weaving Nature and the Urban,” *Architectural Design* 83, no. 3 (2013): 54.

4 MVRDV founding partner Winy Maas recently stated that “the project Biodiversity explores ways to *accelerate* this ongoing process of (im)migration of species using contemporary

concepts of biology such as ‘scaling,’ the measuring of diversity and the principle of ecological succession” (<http://www.mvrdv.nl/en/events/wm-tournai>, my emphasis). Saskia Sassen, in a somewhat different context, made a normative proposal for “delegating back to the biosphere.” I don’t think, however, this notion captures the active, self-creating character of life that biourbanism seeks to cultivate. See Saskia Sassen, “A Third Space,” in *Climates: Architecture and the Planetary Imaginary*, ed. James Graham et al. (Zurich: Lars Müller, 2016), 178.

organized. During the second half of the twentieth century modern urbanism was broadly castigated as formalist, while planning came to be perceived as suffocating life's infinite singularities.

Biomimetic design sustains the latter turn insofar as it rejects the form and the plan as epistemic tools of urban modernity, turning to morphogenetic processes and creative emergence instead. Yet this embrace of more dynamic biological metaphors, I would like to argue, does not resolve the putative formalism of urbanism and planning's bureaucratic conundrums, but rather intensifies and shifts them to a qualitatively higher level. In this sense biourbanism can be interpreted as a processual formalism, and a variant of planning by non-planning. Thus while universality and totality are once again relevant to design, "biomimetic polis" appears to be a contradiction in terms.

PLAN

Architecture has been thought in transhistorical terms of boundary articulation between inside and outside, such as in the notion of a primitive hut by Marc-Antoine Laugier in the eighteenth century. Or it was related, in Gestaltist terms, to the horizon line as a boundary between the visible world and the "beyond."⁵ The boundary, however, can be thought in historically concrete terms of how to separate that which is conducive to life from that which has contrary effects. Vitruvius's *De Architectura* famously begins (and ends) with a recommendation that cities be built far from swampland because "the noxious breath of marsh animals mixes with the mist and wafts into the bodies of the inhabitants."⁶ In *Suspensions about the Hidden Realities of the Air* (1674), chemist and philosopher Robert Boyle interpreted air as a heterogeneous body of particles rather than a mysterious miasma, preconditioning the modern concept of air pollution.

If bad air was a question of good siting for Vitruvius, Boyle's contemporary John Evelyn introduced, in his *Fumifugium, or The Inconveniencie of the Aer and Smoak of London* (1661), the question of industrialization into the equation. In the nineteenth century, as it were, capitalist urbanization reversed the medieval political motto *Stadtluft macht frei*. But air pollution was only one among many biological and sanitary challenges to nascent social and urban forms. Cholera outbreaks precipitated the substitution of miasma theory by germ theory and the rethinking of cities in systemic, infrastructural terms. The challenge to liberal capitalism was launched on two fronts: communism and reformism.

Friedrich Engels, sent by his father on a "Grand Tour" of England's industrial progress, noticed rather the squalid living conditions of the urban proletariat.⁷ He wrote about "an abnormal atmosphere in the working-people's quarters, where ... everything combines to poison the air ... The filth and stagnant pools of the working-people's quarters in the great cities have, therefore, the worst effect upon the public health. ... They are obliged to throw all offal and garbage, all dirty water, often all disgusting drainage and excrement into the streets, being without other means of disposing of them; they are thus compelled to infect the region of their own dwellings. ... They are given damp dwellings,

cellar dens that are not waterproof from below, or garrets that leak from above.”⁸ Yet Engels did not see the solution in improved housing quality pure and simple.⁹ Between the 1840s and the 1870s his moral indignation, framed by the humanist notion of social murder, transpired into a more programmatic position on the housing question, which, Engels argued in a dispute with the socialist utopian idea of proletarian homeownership, could not be solved within the capitalist mode of production.¹⁰

Significantly, such a conviction propelled the urban reformist movement, which was at the heart of sanitary legislation and modern urban planning. In 1844, for example, an act was passed in London that forbade the use of cellars for habitation, and in 1846, the law for setting up public baths in London was introduced. In 1848, the ground-breaking Public Health Act was approved in England, which provided a legal framework for public infrastructural development (sewerage, drainage, waste disposal), including the compulsory purchase of privately owned land.¹¹ But the ambiguity of reformism was soon manifested in France, where a compulsory purchase legislation was invoked, in the wake of the 1848 Revolution, for the widespread clearance of working-class residential quarters.¹² The juxtaposition of sanitary improvements with moral discourse, property speculation and political conservatism in the (in)famous Haussmannian redevelopments heralded a fusion of technocratic urbanism and neo-historicist architecture, as in the Barcelona extension

plan by Cerda, or in the dispute between Otto Wagner and Camillo Sitte over the Ringstrasse development in Vienna.¹³

By the turn of the century planning developed in the direction of the overall organization of urban space. The English Garden City movement, the German *Siedlung* typology, the

⁵ Dalibor Vesely, *Architecture in the Age of Divided Representation: The Question of Creativity in the Shadow of Production* (Cambridge, MA: The MIT Press, 2004), 380.

⁶ Vitruvius, *On Architecture* (London: Penguin Books, 2009), 20. On the centrality of swamps to Vitruvian theory of architecture, see also Bernard Caché, “De Architectura: On the Table of Contents of the Ten Books on Architecture,” *Candide: Journal for Architectural Knowledge* 1 (2009): 9–48.

⁷ Such tours were common among the Prussian elites. The neo-classical architect Karl Friedrich Schinkel, who took one in 1826, admired the “tall obelisks” and “wonderfully Egyptian-oriental forms” of the English industrial landscape. Schinkel is cited in Gillian Darley, *Factory* (London: Reaktion Books, 2003), 29.

⁸ Friedrich Engels, *The Condition of the Working Class in England* (New York: Penguin Classics, 1987), 129.

⁹ Unlike Schinkel, who complained about “monstrous shapeless buildings put up only by foremen without architecture, only the least that was necessary and out of red brick” (cited in Darley, *Factory*, 30).

¹⁰ The relation between moral indignation

and political economic critique in Marx has been a point of recurring dispute in Marxism. In the 1960s, for example, Louis Althusser attacked the humanist turn in Marxism, identifying in Marx an epistemological break between the thematics of alienation and the one of dialectical materialism. Althusser denounced the “young Marx,” as well as various returns to Hegel, and sought to develop Marxism as a scientific theory. Louis Althusser, “The Humanist Controversy,” in *The Humanist Controversy and Other Writings* (1966–67), ed. François Matheron (London: Verso, 2003), 221–305. Jacques Rancière, Althusser’s dissident student, retorted: “The hunt for humanist fireflies is the smokescreen that gives Althusser cover to restore the philosophical form of bourgeois philanthropy: workers need our science.” Jacques Rancière, *Althusser’s Lesson* (London: Continuum, 2011), 11–12.

¹¹ Leonardo Benevolo, *The Origins of Modern Town Planning* (Cambridge, MA: MIT Press, 1980), 93–98.

Benevolo also describes the fervent opposition of liberals such as Herbert Spencer to this legislation.

¹² *Ibid.*, 104.

¹³ On Cerda’s theory of urbanization

Cité Industrielle of Tony Garnier, the early Soviet urban plans, and the programs of CIAM, all formalized in the *Athens Charter*, represent parallel advances of the functional zoning principle, as well as its entrenchment in national and municipal legislations. With the onset of Keynesian anti-cyclical planning after the 1929 crisis, and the first five-year plan in the Soviet Union launched the previous year, the historian Manfredo Tafuri argued that the plan was displaced from the plane of architecture to that of society and economy: “Architecture as ideology of the plan is swept away by the reality of the plan when, the level of utopia having been superseded, the plan becomes an operative mechanism.”¹⁴

NON-PLAN

During the post-war decades, the justification of planning as a remedy to the biological challenges of rampant urbanization was steadily eroded in Western urbanism. Having apparently overcome the most pressing sanitary challenges of urbanization, and leaving behind the cataclysms of war, the post-industrial utopianism of the 1960s perceived the plan as an obsolete remnant of industrial society itself. Gradually, planning came to be seen as an impediment to life, insofar as the latter was understood less in a modern biological sense, and more in the original Aristotelian sense of *bios*—as a “good life.”¹⁵ While such critique coincided with the nascent consumer society, consumption was understood as either a collective practice, as in the subtle renderings of the European TEAM10 group, or an individual freedom, as in the straightforward manifesto *Learning From Las Vegas*. While both currents advocated a return to the street as a locus of the good life, the latter, influenced by American urban experience, came to the fore during the 1970s–1980s neoliberal attack on welfare and collective consumption.

A particularly conspicuous moment in this shift is a programmatic essay titled “Non-Plan,” written by architect Cedric Price, urban planner Peter Hall, architectural historian Reyner Banham, and Peter Barker, the editor-in-chief of *New Society* magazine, where the essay appeared in 1969. The “experiment in freedom,” proposed by British authors, is to be advanced by restricting planning regulation, the aim being “to seize on a few appropriate zones of the country ... and use them as launchpads for Non-Plan.”¹⁶ Propounding the notion of freedom as an untrammelled choice, the experiment also extolled such urban qualities as spontaneity and heterogeneity. Municipal entrepreneurialism (fiscal and tax decentralization, primarily), in which these qualities would be grounded, was for the authors but a self-evident footnote to their worldview shaped by cybernetics, pop culture, and a “mass affluence revolution.” The essay concludes with a sarcastic invocation of the Marxism of “the under-sevens [... among whom] Marx is best known as the maker of plastic, battery-driven dump trucks.”¹⁷

Since the 1970s the outwardly defiant “non-plan” has inspired the Thatcher government to implement enterprise zones, and instigated such conspicuous projects as the redevelopment of London Docklands.¹⁸ What the “non-plan’s” argument missed, characteristically, was that in enterprise zones planning hardly disappeared, but was rather relegated to non-governmental and politically unac-

countable domains (obscured by such notions as decentralization or governance).¹⁹ The trumpeting of consumer freedom effectively obfuscated a structural difference between consumerism and entrepreneurialism, as witnessed in the authors' persistent apology for suburbia as an apparently unmediated spatial manifestation of spontaneity.²⁰

LIFE

Arguably, its apology for real estate speculation and suburbanization put such a position at odds with the nascent environmentalist movement. By this term, however, I do not simply mean nature protection, but a new type of holism that pertains to biological metabolism (organism-ecosystem distinction) and cybernetic communication (systems-environment distinction) alike. The challenge for such "environmentalism" was not only bureaucratic planning but also the free market economy, insofar as it expanded without limits and unsustainably.

This paradigm was grounded in the epistemology of systemic complexity introduced by second-order cybernetics. From this viewpoint chaotic urbanism engendered by unregulated capitalist growth was indeed a challenge, but planning was no longer an adequate answer to it. The antidote to both was to engender order out of the chaos of nature, or life itself.²¹ Cybernetic neovitalism emerged as a third alternative to planned homogeneity and formless chaos, in which the principle of spontaneity was embraced less in a strictly liberal sense of consumerist freedom, and more as

see Ross Exo Adams, "Natura Urbans, Natura Urbanata: Ecological Urbanism, Circulation, and the Immunization of Nature," *Environment and Planning D: Society and Space* 32 (2014), 12–29. On Wagner and Sitte, see Carl Schorske, *Fin-de-Siècle Vienna: Politics and Culture* (New York, Vintage Books: 1981), 24–115. In 1889 Sitte exclaimed sarcastically: "Yes! To conceive everything systematically ... until ... all joyful sense of life [is] suffocated" (cited in *ibid.*, 63).

14 Manfredo Tafuri, *Architecture and Utopia: Design and Capitalist Development* (Cambridge, MA: MIT Press, 1976), 135.

15 Eugene Thacker, *After Life* (Chicago: The University of Chicago Press, 2010), 12.

16 Reyner Banham, Paul Barker, Peter Hall, Cedric Price, "Non-Plan: An Experiment in Freedom," *New Society* 13, no. 338 (1969): 436. The Non-Plan put forward three zones: the Lawrence country of the East Midlands, the Constable country, situated some 40 kilometres north of London, and the Montagu country on the Isle of Wight.

17 *Ibid.*, 443.

18 Barker credited Alfred Sherman for bringing the Non-Plan to Margaret Thatcher's attention. It was from Sherman, the co-founder with Thatcher of the Centre for Policy Studies, that "one of the few friendly reactions [to the Non-Plan] came," explained Barker, adding complacently: "After the first Thatcher administration was elected in 1979, enterprise zones were introduced as a Non-Plan experiment. Without enterprise zones, we would have no

MetroCentre Gateshead and no Canary Wharf." Paul Barker, "Non-Plan Revisited: Or the Real Way Cities Grow. The Tenth Reyner Banham Memorial Lecture," *Journal of Design History* 12, no. 2 (1999): 98. See also Barker's interpretation of this trajectory as "thinking the unthinkable" in the eponymous essay: Paul Baker, "Thinking the Unthinkable," in *Non-Plan: Essays on Freedom, Participation and Change in Modern Architecture and Urbanism*, ed.

Jonathan Hughes and Simon Sadler (London: Routledge, 2000), 2–12. Peter Hall's "freeport solution," presented at a 1977 speech to the Royal Town Planning Institute, is an important moment on the Non-Plan to enterprise zone trajectory. See Jonathan Hughes, "After Non-Plan: Retrenchment and Reassertion," in Hughes and Sadler, *Non-Plan: Essays on Freedom*, 166–183; and Sam Wetherell, "Freedom Planned: Enterprise Zones and Urban Non-Planning in Post-War Britain," *Twentieth Century British History* 27, No. 2 (2016): 266–289.

19 See Keller Easterling, *Extrastatecraft: The Power of Infrastructure Space* (London: Verso, 2014), 25–70.

20 This includes the now-classic Reyner Banham, *Los Angeles: The Architecture of Four Ecologies* (New York: Harper & Row, 1971), and more recently, Paul Barker, *The Freedoms of Suburbia* (London: Frances Lincoln, 2009).

21 See Ilya Prigogine and Isabelle Stengers, *Order Out of Chaos: Man's New Dialogue with Nature* (New York: Bantam Books, 1984).

a propensity towards morphogenetic and autopoietic processes of life (both human and non-human).

There are two trajectories how cybernetics and vitalism came to bear on architecture. One line is the translation of continental philosophy to US academia during the 1980s. In US architecture theory, the deconstructivism of the 1980s, influenced by the work of Derrida, gave way to the projective turn during the 1990s, influenced by the work of Deleuze. At the centre of the reception of this philosophy was the problem of representation. While the work of Derrida revolves around the impossibility of representation—the problem of its negativity, we could say—the philosophy of Deleuze does away with the problem of representation and negativity for good, substituting these with affirmation and actualization (of the virtual).

The *Architecture Design* issue *Folding in Architecture* (1995) is a key document in this reception, centred on the notion of fold. Peter Eisenman's temporal reading of fold as a historical contingency (on the back of his Rebstock project) contrasted with the notion of fold informed by early CAD/CAM technology, advanced by Greg Lynn, the issue editor and Eisenman's student. What folded, for Lynn, was not a historical time, but a physical space; the fold was not dialectically broken, but formally smooth.²² Ultimately, the notion of the fold was for Lynn an apology for computer-generated formal exuberance, a thin theoretical veneer. This theory itself was wordy, exuberant, and operative, rather than conceptually sound; Lynn defined folding, for example, as “neither agitation nor evisceration but a supple layering.”²³ If Eisenman's fold was defined by a lack, Lynn's fold was defined by a vitalist excess.²⁴

Other notions such as the rhizome, and Deleuze's and Guattari's critique of organism more broadly, came to bear on architectural discourse via the Zone Books co-founder Sanford Kwinter and other US architectural academics such as Robert Somol, Jeffrey Kipnis, and Michael Speaks. The philosophers' rhizomatic evocations of life as a virtual intensity and a morphogenetic potential (rather than an arborescent organism) resonated with these theorists' defense of the projective against the critical in architecture.²⁵ The millennium translations of Deleuze—from French to English as much as from philosophy to architecture—unfolded on the back of an argument that translation is impossible, or at least undesirable. Charging good-intentioned design for its putative naïveté and formalism—conceiving architecture as translating existing social forms and/or representing alternative of social forms (or even the impossibility of such acts)—the projective paradigm argued for wild experiments with the new, shifting the focus from forms and plans to the processes of formation and their prospecting, affecting, and inflecting.²⁶ While waging war on formalism, however, this architectural domestication of Deleuze itself succumbed to “formationalism,” substituting forms without social content by processes without social ends.

Concomitant with the reception of Deleuze in American architectural theory was the influence of cybernetics on European architectural debates.²⁷ One influential line extended from the work of Heinz von Foerster at the Biological

Computer Laboratory (BCL) at the University of Illinois (1958–1974), the locus of second-order cybernetics. Two points are decisive about the BCL. First, the stress was less on theorizing humans as machines (as in the early cybernetics²⁸ or as in the popular cyborg metaphor propagated by *Wired* magazine during the 1990s) and more on rendering the non-human in terms of living systems. Second, the observer was made part of the observed system, making second-order cybernetics susceptible to the vitalist conundrum: if everything is living, what is the principle of life? It is the problem that Aristotle attempted to solve by distinguishing between *psukhē* and *zoē*,²⁹ vitalists through the notion of *élan vital*, and Deleuze through immanence.³⁰ At the BCL, Humberto Maturana and Francisco Varela developed the theory of autopoiesis, triggering a vogue for the epistemology of self-organization, which, applied to the social field, lends itself to the arcane theories of sociologist Niklas Luhmann, and more recently, via Luhmann, the work of architect Patrik Schumacher.³¹

Among the visiting scholars at the BCL was the British cybernetician Gordon Pask, who made numerous forays into architecture.³² In the essay *The Architectural Relevance of Cybernetics* (1969), Pask proposed a shift from “the inflexible plan to the

22 The essay, like Lynn’s architecture, is permeated with evocations of pliancy, fluidity, curvilinearity and smoothness. Sanford Kwinter recently remarked: “How did Deleuze’s project get picked up by mainstream architecture?

It was absolutely *The Smooth and the Striated*,” a reference to the last chapter of *A Thousand Plateaus*, translated into English in 1988. Kwinter is cited in Simone Brott, “Deleuze and ‘The Intercrossers,’” *Log* 18 (Winter 2010): 147.

23 Greg Lynn, “Architectural Curvilinearity: The Folded, the Pliant and the Supple,” *Architectural Design* 25 (1995): 9. Lynn writes further: “In both cooking and geology, there is no preliminary organisation which becomes folded, but rather there are unrelated elements or pure intensities that are intricately through a joint manipulation.”

24 See also the programmatic essay, published in the same issue, Jeffrey Kipnis, “Toward a New Architecture,” *Architectural Design* 25 (1995): 40–49. For a detailed history of the Folding in Architecture Issue, see Mario Carpo, “Ten Years of Folding,” in *Folding in Architecture*, ed. Greg Lynn (West Sussex: John Wiley & Sons, 2004), 14–19. Note, however, that Carpo has himself meanwhile become an epigone of digital formalism—as evidenced in Mario Carpo, “Breaking the Curve: Big Data and Digital Design,” *Artforum* 52, no. 6 (2014): 168–73, and “The New Science of Form-searching,” *Architectural Design* 85, no. 5 (2015): 25–27.

25 See Douglas Spencer, “Architectural Deleuzism: Neoliberal Space, Control and the ‘Univer-City,’” *Radical Philosophy* 168 (2011), 9–21.

26 These verbs are suggested by Sanford Kwinter, in “Politics and Pastoralism,” *Assemblage* 27 (1995): 25–32.

27 Cybernetics, however, was itself largely developed in the post-war decades by European-born mathematicians and physicists.

28 In 1950, Arturo Rosenbluth and Norbert

Wiener wrote that “men and other animals are like machines from the scientific standpoint ... the only fruitful methods for the study of human and animal behavior are the methods applicable to the behavior of mechanical objects as well.” Cited in Peter Galison, “The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision,” *Critical Inquiry* 21, 1 (1994): 250.

29 On the notion of life in Aristotle, see Thacker, *After Life*, 11–22.

30 Gilles Deleuze, *Bergsonism* (New York: Zone Books, 1991).

31 The neovitalist reception of the concept of autopoiesis is paradoxical insofar it goes against the grain of Maturana and Varela’s ambition to conceptualize living systems in mechanical terms. John Protevi surmised that “Varela refuses to countenance the use of autopoiesis as a model for social systems ... because when ... it is the model for a way of social being, then social systems become obsessed with physical boundaries, leading to a fratricidal zero-sum competition.” John Protevi, “Beyond Autopoiesis: Inflections of Emergence and Politics in Francisco Varela,” in *Emergence and Embodiment: New Essays on Second-Order Systems Theory*, ed. Bruce Clarke and Mark B. N. Hansen (Durham: Duke University Press, 2009), 95. See also a remark by Varela that “Luhmann was the worst thing to have happened to him,” cited in Mark B. N. Hansen, “System-Environment Hybrids,” in *Emergence and Embodiment*, 131.

environmental computing machine.”³³ He argued that architecture should become “an odd mixture of catalyst, crutch, memory and arbiter”³⁴ and suggested that the Park Guell by Gaudí—an early twentieth-century project steeped in organicist aesthetics and mythic iconography—is “one of the most cybernetic structures in existence.”³⁵ However, it was Pask’s less architecturally pronounced research that had a greater conceptual bearing on the discipline. In the 1960s he studied the behaviour of slime molds, experimenting with how their morphogenesis can be controlled by changing signals about their food environment.³⁶ He studied slime molds as cellular automata, a prototypical model of emergent self-organization, in which complex formations are generated from relatively simple rules applied to relatively simply initial states.³⁷

Pask’s worldviews were taken up primarily via the Architectural Association in London,³⁸ where in the early 1990s John Frazer developed a concept of evolutionary architecture.³⁹ Through a series of diploma studios, bearing titles such as *Universal Constructor* (1990) and *Universal Interactor* (1992), Frazer foregrounded the cellular automata principle as “a natural model for architecture” which develops from an initial “seed.”⁴⁰ In a 1995 publication introduced by Pask, Frazer writes: “The profligate prototyping and awesome creative power of natural evolution are emulated ... Successful developments are encouraged and evolved. Architecture is ... subject, like the natural world, to principles of morphogenesis, genetic coding, replication and selection.”⁴¹ More recently, Frazer insisted on a need to *accelerate* these evolutionary processes in architecture.⁴²

ANTHROPOCENE

Deleuzian and cybernetic understandings of nature, as respectively an immanent force of creative life and a self-organizing, emergent system, have inspired the reception of biomimicry as a guiding programmatic thread for contemporary architecture and urbanism. Since the turn of the century biomimetic design has foregrounded questions of morphogenesis (the evolution of living forms) against those of surficial aesthetics (green façades) and morphology (organic style). Nature, in this understanding, would not be a repository of formal models, but an algorithmic guide through an infinite differentiation of life.

For applied biomimetic research, as Jesse Goldstein and Elizabeth Johnson have argued, nature has become a teacher lecturing on its immanent potential to create and innovate: “[N]onhumans are reimagined as a guide for industrial innovation, through which the processes of production can no longer be thought in strictly anthropocentric terms. To make this transition, humans must learn to become ‘more affected’ by the skills and processes of nonhuman life.”⁴³ The “environmental” shift from the exploitative concept of nature to the pedagogical one, underpinned by a heightened attentiveness towards non-human life, appears to have restored the species-notion of the human (as in “humanity”) by the very same token. At the same time, the biomimetic notion of nature-as-solution conveniently ignores that putting nature to work is itself a

new form of control—a conundrum that Deleuze came to recognize as potentially lodged within his own philosophical project.⁴⁴

A challenge to grapple with is that biourbanism appears to manifest neovitalist aspects within the Anthropocene concept. French philosopher and political ecologist Pierre Charbonnier interpreted the Anthropocene debate as a convergence of two epistemic paradigms: the risk paradigm of postmodern sociology, associated with the problem of social reflexivity and its local effects, and the paradigm of limits to planetary metabolism, developed by the Earth System science.⁴⁵ Charbonnier

32 On the affiliation between Pask and Foerster, see Heinz von Foerster, “On Gordon Pask,” *Systems Research* 10, no. 3 (1993): 35–42. Von Foerster esteemed Pask’s Gestaltist capacity to comprehend apparently impenetrable network diagrams of criss-crossing arrows: “He just sees operational, functional, semantic, etc., relational structures at an arbitrary depth ... Therefore, I call Gordon a genius.” (Ibid., 41, emphasis in original). Note that Kevin Kelly used identical terms to celebrate Stuart Kauffman, biologist and early exponent of complexity theory: “Out of that random mess, Kauffman suddenly felt sure, would come inadvertent order. ... The complexity of points and arrows seemed to be generating a spontaneous order. To Kauffman ... it felt like home.” Cited in Reinhold Martin, “Complexities,” *The Journal of Architecture* 3, no. 3 (1998): 190.

33 Gordon Pask, “The Architectural Relevance of Cybernetics,” *Architectural Design* 9 (1969): 496.

34 Ibid.

35 Ibid., 495. For Pask, the adjective “cybernetic” denoted “a variety (novelty) producing juxtaposition of releasers and supernormal stimuli (evoking inbuilt emotive responses) within a thematic matrix.” (Ibid.) While he associated the liberation of agentic capacities with intensified perceptual experience, there is an enduring sense of environmental determinism to architecture envisioned as evolutionary or trend-anticipating.

36 “I wanted to see how [the] existence [of slime molds] was determined by giving them the acrasin signalling system which gets them from here to there,” stated Pask. See Gordon Pask, “A Proposed Evolutionary Model,” in *Principles of Self-Organization: Transactions of the University of Illinois Symposium on*

Self-Organization, ed. Heinz von Foerster and George W. Zopf, Jr. (New York: Pergamon Press, 1962), 248. See also, Alicia Imperiale, “Stupid Little Automata,” *Architecture and Culture* 2, no. 2 (2014): 261–282. Although the interpretation of slime mold behaviour closely resembles Jakob von Uexküll’s notion of *Umwelt*, expounded in the 1930s, Pask does not make reference to Uexküll. See Jakob von Uexküll, *A Foray into The Worlds of Animals and Humans, with A Theory of Meaning*, trans. Joseph D. O’Neil (Minneapolis: University of Minnesota Press, 2010).

37 The model is a two-dimensional cellular grid. It operates as a binary automaton, in which the value of a cell in step x determines the value of neighbouring cells in step $x+1$. The model was devised by mathematician John von Neumann in the 1940s, and popularized, in 1970, by Horton Conway’s *Game of Life*.

38 Pask’s participation in Cedric Price’s Fun Palace project would require a separate investigation, a task that was initiated by Stanley Mathews in “The Fun Palace as Virtual Architecture: Cedric Price and the Practices of Indeterminacy,” *Journal of Architectural Education* 59, no. 3 (2006): 39–48, and Anthony Iles, “Legislating for Enthusiasm: From Fun Palace to Creative Prison,” *Arcade—Sacrifice Zone* 3 (2009), <http://www.arcade-project.com/sacrifice/legislating-for-enthusiasm.pdf>.

39 In an eponymous essay Frazer credited Pask’s cybernetics with filling “a significant vacuum in architectural theory.” John Frazer, “The Architectural Relevance

of Cybernetics,” *Systems Research* 10, no. 3 (1993): 44. Pask gave regular public talks at the AA, and John Frazer taught there in 1973–1977 and 1987–1996. See Andrew Pickering, *The Cybernetic Brain: Sketches of Another Future* (Chicago: The University of Chicago Press, 2010), 473 (67n and 69n).

40 John Frazer, *An Evolutionary Architecture* (London: Architectural Association, 1995), 9.

41 Ibid.

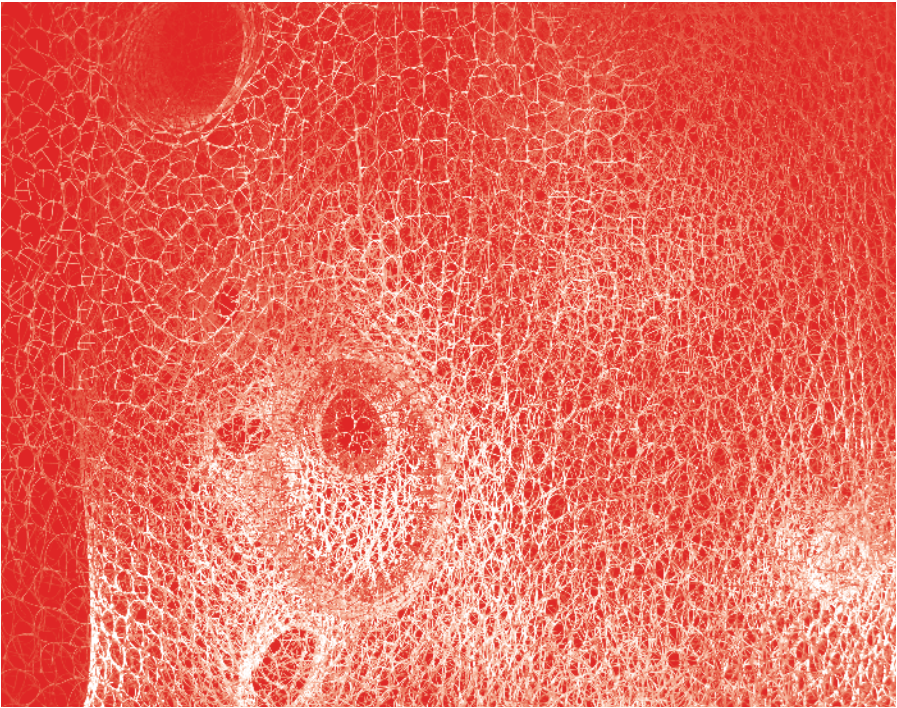
42 John Frazer, “Accelerating Architecture: The Art and Science of Autotectonics,” <http://www.johnfrazer.com/speaker-aarch.html>.

43 Jesse Goldstein and Elizabeth Johnson, “Biomimicry: New Natures, New Enclosures,” *Theory, Culture & Society* 32, no. 1 (2015): 67. Outside of architecture, biomimetic research has been pioneered by Janine Benyus, a nature writer turned innovator. Benyus is the editor of *Biomimicry: Innovation Inspired by Nature* (1997) and co-founder of the Biomimicry Guild (1998), the Biomimicry Institute (2006) and the non-profit organization AskNature.org (2008).

44 On the conspicuous convergence of Deleuze and cybernetics, and the interpretation of Deleuze’s notion of the control society as possibly a critical reflection on this convergence, see David M. Berry, Alexander R. Galloway, “A Network Is a Network Is a Network: Reflections on the Computational and the Societies of Control,” *Theory, Culture & Society* 33, no. 4 (2016): 151–172. See also Gilles Deleuze, “Postscript on the Societies of Control,” *October* 59 (1992): 3–7.

related the convergence of social and natural sciences around the Anthropocene to the new ontology of global risk. Its apocalyptic character is manifested as a negative re-enchantment, in which the ethics of urgent action converges with the aesthetics of spontaneity and immersiveness. The danger, for Charbonnier, is that the Anthropocene paradigm will occlude the democratic capacity to articulate societal contradictions, as well as a political will to act upon social ills, either by instrumentalizing technocratic expertise or venerating, in a quasi-religious manner, the immediacy of nature and culture.⁴⁶

While the assimilation of the ontology of global risk in urbanism has less to do with the straddling per se of the social and natural sciences, which has been central to its historical development,⁴⁷ it is all the more permeated with



Branching Morphogenesis, 2008. Sabin+Jones LabStudio. Photo by Jenny E. Sabin

technocratic and quasi-religious tendencies. Urbanism in its biomimetic turn is perhaps the “privileged” medium through which these perils are actualized today.⁴⁸ Biourbanism will surely unfold “smartly,” by tracing and modulating “the position of any element within an open environment at any given instant.”⁴⁹ Yet this urban variant of the control society is potentially lent credibility by the Anthropocene concept itself, where boundaries between the urban and the natural appear as blurred as those between scientific reason and artistic imagination, with operations and algorithms of control eluding its conceptual grasp.

BREEDING THE BIOMIMETIC CITY?

I want to elucidate the conundrums of biourbanism with three examples. Developing the bioarchitectural rendering of cellular automata by Pask and Frazer, Michael Batty, planner and head of the Bartlett Centre for Advanced Spatial Analysis, advocates a “digital breeder for cities.”⁵⁰ Predictably, Batty champions organic order and rails against centralized planning. His organicism is defined at a cellular level, and lends itself to the metaphor of bottom-up self-organization. Batty’s quest for forms that would be bred “from cells to cities” is grounded in the principle of morphological scaling, according to which self-organization equals self-replication at different scales.⁵¹

But how does the planner want to breed cities? “The starting point should always be the rules that generate real cities, [and] the challenge lies in defining changes to these rules that improve the workings of real cities by meeting goals pertaining to flows, densities and economies of agglomeration.”⁵² But Batty tells us nothing about how and who would define these changes, nor about the mechanisms for identifying those elusive goals. While his response might be that the digital breeder is simply a technical tool that helps decision-makers make better decisions, the foregrounding of flows, densities, and agglomerations as the principal problematic of urbanism mirrors, in a telling way, the logical structure of the cellular automata model itself. In urban cellular automata, Batty tells us, “each individual is a solid white dot who begins to

search for the ‘city’—the red dot.”⁵³ The problem with such modeling is not merely that it is an insufficient approximation of reality, but that it rests on a fundamental conceptual misunderstanding of individuals and cities as two distinct entities.⁵⁴

BIOMIMICRY AS A PURELY TECHNICAL SOLUTION?

The project of scaling the cellular and the architectural also defines the work of the Philadelphia-based LabStudio,

45 Pierre Charbonnier, “Généalogie de l’anthropocène: Le risqué et les limites comme paradigmes théoriques,” paper presented at the symposium *Comment penser l’Anthropocène?* Paris, 6 November 2015. On the history of Earth System science, see Eva Löybrand, Johannes Stripple, and Bo Wiman, “Earth System Governmentality: Reflections on Science in the Anthropocene,” *Global Environmental Change* 19 (2009): 7–13.

46 Pierre Charbonnier, “L’ambition démocratique à l’âge de l’anthropocène,” *Esprit* 12 (2015): 43–44.

47 Since their emergence in the late nineteenth century, urban planning and urbanism have developed an uneasy relationship with the *Geisteswissenschaften*-*Naturwissenschaften* distinction, as theorized by Wilhelm Dilthey. See Dilthey, *Selected Works, Volume I: Introduction to The Human Sciences* (Princeton: Princeton University Press, 1991), 47–170.

48 In Ross Exo Adams’s critical reading of ecological urbanism

“urbanization is no longer merely synonymous with nature, but it is now its provider, its precondition.” Adams, “Ecological Urbanism,” 27.

49 Deleuze, “Postscript,” 7. See also my paper, “Towards a Critique of Cybernetic Urbanism: The Smart City and the Society of Control,” *Planning Theory* 17, no. 1 (2018): 1–23.

50 Michael Batty, “A Digital Breeder for Designing Cities,” *Architectural Design* 79, no. 4 (2009): 46–49.

51 Michael Batty and Yichun Xie, “From Cells to Cities,” *Environment and Planning B: Urban Analytics and City Science* 21, no. 7 (1994): 31–48.

52 Batty, “Digital Breeder,” 49.

53 *Ibid.*, 48.

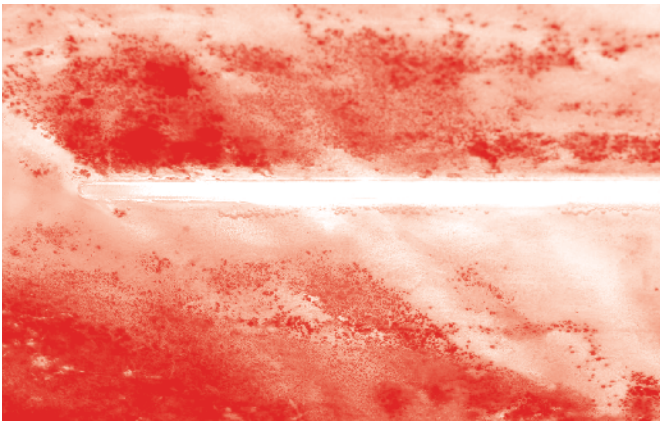
54 See David Wachsmuth, “City as Ideology: Reconciling the Explosion of the City Form with the Renacity of the City Concept,” *Environment and Planning D: Society and Space* 32, no. 1 (2014): 75–90; AbdouMalik Simone, “People as Infrastructure: Intersecting Fragments in Johannesburg,” *Public Culture* 16, no. 3 (2004): 407–429.



Urban Algae Folly. Aarhus ecoLogicStudio. ©NAARO

a collaboration between architect Jenny Sabin and cellular biologist Peter Lloyd Jones. Their *Branching Morphogenesis* project (2008), featured on the cover of *Science* magazine, is an immersive environment made from 75,000 plastic cable ties that simulates lung cellular tissue. Sabin described the installation as “the gestalt notion of bringing ‘cellness’ into tangible, scalable scenarios.”⁵⁵ It inverts the cell-organism relationship and foregrounds the pliancy of a cellular environment.

The LabStudio’s mission, in Sabin’s words, is “to simulate and inhabit geometry as nature does, absent of representation and translation, in a constant formation, where geometry and matter are one.”⁵⁶ The focus of *Branching Morphogenesis*, as well as the *PolyMorph: Digital Ceramics* project (2013), which experiments with ceramic production by circumventing the process of molding, is less in how cells fold into definite shapes and more how they enfold subjects. Sabin is cognizant not to give in to the temptation of organicist aesthetics, arguing that “we have a responsibility to move beyond shape-making.”⁵⁷



Urban Algae Folly. Aarhus ecoLogicStudio. ©NAARO

Whence this responsibility, however, and on what ethical grounds? Sabin finds “purely technical solutions to environmental sustainability” deficient, and advocates instead the fusing of built environments and living systems into “thriving hybrid ecosystems.”⁵⁸ Such a program was explored in the *e-Skin* project (2013), in which cell contractility inspired adaptive building skins that respond to bodily movements: all in the quest to optimize the energy performance of buildings.

The pitfall, to be sure, is in the way a boundary between the biological and the technical is articulated, as if biomimicry would in itself defy technicist fetishism. The convergence between the performativity of cellular behaviour and global energy risks in fact has the opposite effect: rendering the biological itself into a “purely technical solution.”⁵⁹ The crux of the matter is the desire of architecture to circumvent translation and representation. The trading of the processes of mediation for immediate effects and affects situates architectural biomimicry within the Anthropocene paradigm of urgent action and immersiveness. But if the desirability of non-representational forms is grounded in the fusion of cells and cities, then bioaesthetic forms become one with the forms of urban politics. Lodged within the aesthetics of biomimicry lurks a worrying proto-fascist desire for a unified biosocial body that is not only without gaps and conflicts, but without mechanisms of translation and representation through which these gaps and conflicts can be articulated.

THE VANISHING MEDIATION OF BIOURBANISM?

The aesthetics of non-representational urbanism and the scaling of cellular growth defines the work of the London-based EcoLogicStudio, whose Claudia Pasquero is also director of the Bartlett Urban Morphogenesis Lab. “After architecture ... a new Nature!” states the manifesto of Pasquero and Marco Poletto, who “propose to redefine the ‘city’ as a fertile terrain for breeding new practices for the synthesis of ‘agri-urban’ ecosystems ... engaging with the organisation of matter, energy and information across scales.”⁶⁰ “Harvesting this inherent vitality,” states the introduction to the *Operating Manual for the Self-Organizing City*, the office’s main publication titled after the eponymous book of Buckminster Fuller, “gives us ... generative moments ... that become seeds for new virtual plots, new proto-gardens,

⁵⁵ Sabin, cited in Terri Peters, “Jenny Sabin Draws Connections among Computer Science, Architecture and Cellular Biology,” *Mark Magazine* 23 (2009): 203.

⁵⁶ Sabin, cited in Alicia Imperiale, “Stupid Little Automata,” *Architecture and Culture* 2, no. 2 (2014): 275.

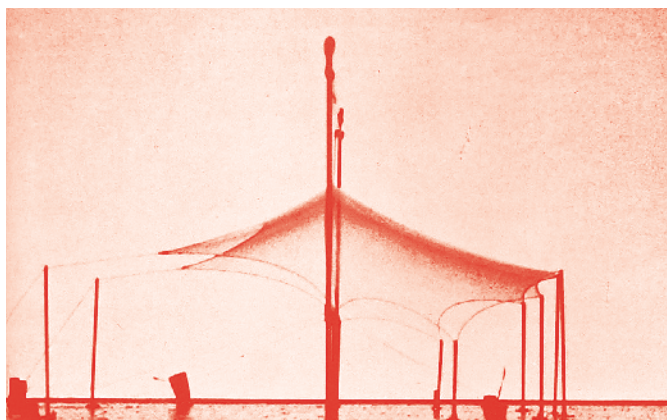
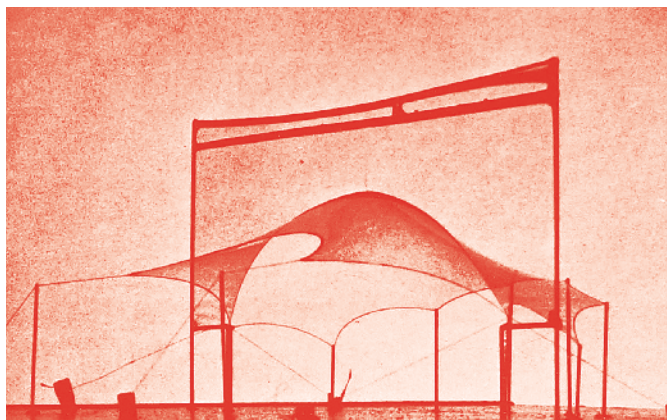
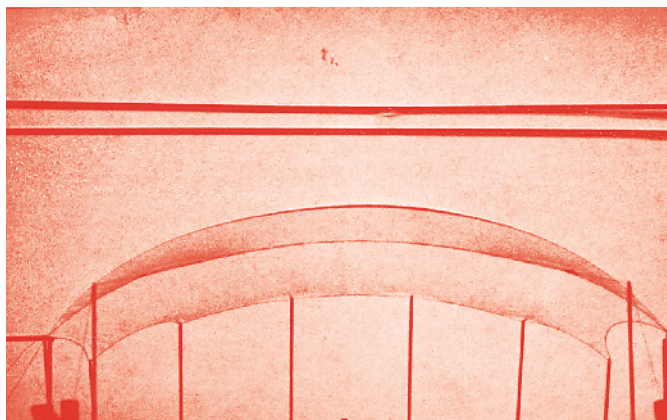
⁵⁷ Sabin, cited in Peters, “Jenny Sabin Draws Connections,” 205.

⁵⁸ Jenny Sabin, “Transformative Research Practice: Architectural Affordances and Crisis,” *Journal of Architectural Education* 69, no. 1 (2015): 64.

⁵⁹ Ibid. We can think here about Frei Otto’s notion of “natural structures” extending from the physical to the biological,

informing his research at the Institute for Lightweight Structures at the University of Stuttgart: studying soap bubbles to calculate surfaces of minimal tension, and simulating the “pneumatic” behaviour of diatoms and radiolaria. See Frei Otto, Rainer Barthel, and Berthold Burkhardt, *Natürliche Konstruktionen* (Munich: Dva, 1985); Berthold Burkhardt, “Natural Structures: The Research of Frei Otto in Natural Sciences,” *International Journal of Space Structures* 31, no. 1 (2016): 9–15.

⁶⁰ Marco Poletto and Claudia Pasquero, “Office profile,” <http://www.ecologic-studio.com/v2/about.php>.



Kenzo Tange & Urtec in cooperation with Frei Otto, 1969, soap bubble models for Kuwaiti Sport Center project. Assessing both the urban-design and architectural design requirements, the bubble models helped determine initial form and location of pressure arches for the sport complex roof.
Courtesy of the ILEK archive.

and new ecoMachines.”⁶¹

Like other architects inspired by biomimicry, EcoLogicStudio’s interests lie in the morphogenetic potential of biological growth. A series of projects studied how algal farming can be used in optimizing the climatic performance of buildings, become fused with interactive, digital control systems, but also how it could stimulate declining regional fisheries. These experiments aligned with the “mainstream” of biourbanism insofar as they were grounded in a more fundamental conviction about the symbolic capacity of algae and other biological materials to embody the process of urbanization itself. Yet what is distinctive about the EcoLogicStudio is that their biomorphogenesis pertains to materials that qualify as organic waste.

Slime mold, which we encountered as the leading hero of Pask’s cellular automation, is at centre stage in Pasquero and Poletto’s mission to render “cities as biological computers,” too.⁶² The mission carries the metaphor further, foregrounding slime mold as an agent of decomposition and decay. In this capacity, however, slime mold is rendered as a pharmakon of sorts, an agent of recycling. Whether the waste is cyanobacterial blooms or vegetable peels, slime molds are put in a position to recycle these into economic assets and construction materials—and, more generally, turn the waste into a form and a value.

In a project for reclaiming depleted copper from a mining corridor in Arizona (2013–14), developed at the Urban Morphogenesis Lab,

EcoLogicStudio claimed to integrate “a living *Physarum polycephalum* grown on a spatial/morphogenetic substratum and a Satellite-driven informational territory.”⁶³ Yet such vitalist, post-humanist jumping of scales also sustains the commodification of waste on a scale from cells to cities, all the while willfully obscuring how politico-economic processes render organic matter and urban regions into biowaste and wastelands in the first place. As Tahl Kaminer wrote, citing the invention of Marmite from the leftovers of beer brewing, “the process of reintegrating refuse into the production-consumption cycle is also of uttermost importance to capitalist economy, and preceded the rise of environmental concerns ... Recycled material is no longer trash ... [but] surplus profit.”⁶⁴

In the EcoLogicStudio’s hands, the biologic computation metaphor sustains an ever deeper integration between metabolic and cybernetic aspects of the biomimetic impulse: “[Slime mold can perform] extremely sophisticated tasks such as network optimizations, nutrient regulation, and may even anticipate events ... without recurring to a centralised brain. Urban systems also demonstrate optimisation behaviours; after all, cities too must adjust the way

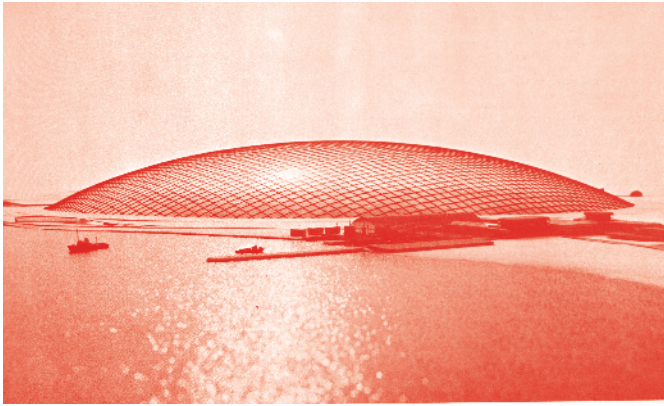
61 Marco Poletto and Claudia Pasquero, *Systemic Architecture: Operating Manual for the Self-Organizing City* (London: Routledge, 2012), 3.

62 Claudia Pasquero and Marco Poletto, “Cities as Biological Computers,” *Architectural Research*

Quarterly 20, no. 1 (2016): 10–19.

63 *ibid.*, 11.

64 Tahl Kaminer, “The Triumph of the Insignificant,” in *Trash Culture: Objects and Obsolescence in Cultural Perspective*, ed. Gillian Pye (Bern: Peter Lang, 2011), 97.



Frei Otto's Arctic City Envelope project, 1971. Spherical pneumatic membrane and reinforcing rope net. Envisioned as a roof over an arctic city with 45,000 inhabitants, the internal pressure via a nuclear-powered AC system, combined with mobile lighting and shading technologies would allow the membrane to moderate according to extreme weather conditions for a sustainable environment for both humans and vegetation. Courtesy of the ILEK archives.

they move around goods and energy, need to regulate the amounts they extract from each extraction/production site, and are always trying to predict or anticipate daily, seasonal, or epochal fluctuations.”⁶⁵ The biological computational understanding of the urban might appear to coincide with the vanishing of architectural design itself. However, such a view would be misleading. Rather than *vanishing itself*, however, biomimetic design functions as a *vanishing mediator* between the formalization of biological morphogenesis as a unified model of urban dynamics,⁶⁶ and the apparently inevitable forces of global markets.⁶⁷ Rather than sustaining neoliberal deregulation pure and simple, biourbanism embodies its extension, whereby the labour of architecture is consistent with incubating the entrepreneurial potential of urban nature (human and non-human alike).



Frei Otto, Lath Dome Structure at the 1962 German Building Exhibition, and accompanying suspended rope net membrane model. Courtesy of the ILEK archive.

BIOMIMETIC POLIS?

In a classic passage from *Capital*, Marx writes: “A spider conducts operations that resemble those of a weaver, and a bee puts to shame many an architect in the construction of her cells. But what distinguishes the worst architect from the best of bees is this, that the architect raises his structure in imagination before he erects it in reality. At the end of every labour-process, we get a result that already existed in the imagination of the labourer at its commencement.”⁶⁸ In discriminating the labours of nature and humans, Marx’s metaphor did not dwell on the quality or complexity of architecture, but on the translation and representation that it inherently involves.⁶⁹ If urban planning was an instrument of collective consumption that foregrounded the social character of labor process beneath the sum total of individual imaginations, the objective of biourbanism is arguably to circumvent any and all representations, and breed cities from biological cells. Conceptually, such projects surf on a wave of two intellectual currents—cybernetic identification of ontology and epistemology, and Deleuze’s assertion that “pluralism=monism”—and elaborates, in the field of urbanism, the becoming-indiscernible of the boundary between nature and culture.⁷⁰

But can representation really be done away with? Rather than offering a viable alternative to technocratic conundrums of urban planning itself, the imaginary field of biourbanism constitutes a furthering of these tendencies in an unholy marriage with the entrepreneurialization of nature.⁷¹ What is represented in

the architect’s mind is no longer an urban form, but the form of the biomimetic process of morphogenesis itself. Biourbanism is the formalism of the process. Therefore, it is not merely an ideology of “greenwashing,” but a willful circumvention of the political dilemmas of urban life—how does the polis represent its subjects? how is the polis translated into greater subjective freedom?—by the ethics and aesthetics of neovitalism.

Archival image research, compilation, and captions
by Jake Valente.

65 Pasquero and Poletto, “Cities as Biological Computers,” 14.

66 A biological update, as it were, to Jay W. Forrester, *Urban Dynamics* (Waltham, MA: Pegasus Communications, 1969).

67 Fredric Jameson defines a vanishing mediator as “a catalytic agent which permits an exchange of energies between two otherwise mutually exclusive terms” and “serves as a bearer of change and social transformation, only to be forgotten once that change has ratified the reality of the institutions.” Fredric Jameson, “The Vanishing Mediator: Narrative Structure in Max Weber,” *New German Critique* 1 (1973): 78–80.

68 Karl Marx, *Capital, Volume I* (New York: Penguin, 1990), 284.

69 While Marx can be criticized for believing that “the nonhuman does not engage in planning,” this critique is hardly supported by the fact that “in war it is this exact attribute of the bee—the absence of planning, even

intentionality—that is at the heart of its usefulness in modern warfare as a flexible, decentralized, adaptive form.” (Jake Kosek, “Ecologies of Empire: On the New Uses of the Honeybee,” *Cultural Anthropology* 25, no. 4 (2010): 669.) If military leaders or architects find useful to mimic spiders, bees and other forms of “vibrant matter,” this is insufficient for explaining this process by “a human-nonhuman working assemblage,” as Kosek does, following Jane Bennett (*Ibid.*). The absence of planning does not equal planning by non-planning, and the human-nonhuman binary (that Kosek reproduces even as he aims to do away with it) misses a third term: humans-mimicking-nonhumans.

70 See also Frédéric Neyrat, *La part inconstruible de la terre: Critique du géo-constructionnisme* (Paris: Seuil, 2016).

71 Jessica Dempsey, *Enterprising Nature: Economics, Markets, and Finance in Global Biodiversity Politics* (London: Wiley, 2016).