Introduction

From Epiphylogenesis to General Organology

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> The present historical condition … is marked by three momentous and interconnecting changes. First at the social level, we witness increasing structural injustices through the unequal distribution of wealth, prosperity and access to technology. Second at the environmental level we are confronted with the devastation of species and a decaying planet, struck by climate crisis and new epidemics. And third, at the technological level, the status and condition of the human is being redefined by the life sciences and genomics, neural sciences and robotics, nanotechnologies, and new informational technologies and digital interconnections they afford us.
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> Rosi Braidotti, *Posthuman Feminism*[1]

> I would go as far as to insist that more than any other time in our brief history on Earth, we are experiencing a clash of temporalities: geological time, the deep time of those processes that fashioned our terrestrial home; historical time; and experiential time. All these times now fold in on one another. We are not used to thinking of time as simultaneous. We think of time as linear: past, present, future. So how do we begin to think about time in a way that takes these concatenations seriously?
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> Achille Mbembe, 'How to Develop a Planetary Consciousness'[2]

Bernard Stiegler (1952–2020) was a French philosopher of technology, influenced by Gilbert Simondon's mechanology and Jacques Derrida's deconstructivism. He left us with a complex oeuvre that will be difficult to outline. Stiegler's writings constitute a next level of conceptual alienation even for those used to neologisms. He composed and saturated an evolving apparatus of adopted concepts to deconstruct and think through our current technological condition. Among these are gems like hypomnesic tertiary retentions and protentions; exosomatic organogenesis, neganthropy, neganthropology and neganthropocene; general organology. This introduction will barely scratch the surface in comparison to a number of book-length works that strive to unpack Stiegler's highly syncretic way of thinking and collaborative working style.[3] While less synoptic than these studies, we hope to provide a genealogy that does justice to Stiegler's original complexities and convolutions.

Stiegler's work is first and foremost concerned with technology – or more specifically technics, referring to the general domain of technical practice as a system, as distinguished from the modern combination of technics and the sciences, and the resulting rationale (*logos*) to which technics are put – and its relation to forms of evolution, becoming, individuation, and subjectivity.[4] From the initial volume(s) of *Technics and Time* he developed a philosophically based theoretical framework concerning the historical conditioning of technics within evolutionary processes.[5] The central argument is best summed up by the line 'it is the "what" [that is, some material condition] that invents the "who" [as a subject]'.[6] The Stieglerian reversal (of the reversed ontology) has been refined across many subsequent projects, often published as

multi-volume studies.[7] Around 2010 he started to derive a particular methodological (if not didactic) framework that enables transformative action.[8] Stiegler's oeuvre can thus be divided according to three central concepts that will be explained below: 1) organology, 2) pharmacology, 3) neganthropology. More than subsequent phases these mark three mutually dependent intellectual endeavours to rethink how technics steer evolutionary processes, in both past and contemporary developments.

Even if Stiegler rarely touched on the subject of architecture directly, he nonetheless provides invaluable material for critically rethinking the built environment as a man-made existential niche: 'to create one's own milieu is to build'.[9] The purchase of Stiegler's concepts for architecture is to be found in the proposition of a novel theoretico-methodological turn towards so-called epi-phylo-genetic processes. These processes are to be embraced by an architectural discourse if we want to bolster the post-Foucauldian genealogical stances, which subsume architecture under the general history of techne.[10] We thus turn our attention to the evolving account of epiphylogenesis to familiarise the reader with the conceptual meshwork that Stiegler deployed. (Fig. 1) A subsidiary aim is to trace the transposition of this theoretical landscape into a three-stranded analytical approach for critically investigating past and ongoing technological developments in the light of their famously ambiguous characteristics.

It is important to stress that *Footprint* 30 does not study Stiegler's work in isolation, nor do we provide a facile 'Stiegler for architects' account. Following his own syncretic style and pharmacological attitude we consider any work to be most powerful when read alongside adjacent streams of theorising socio-techno-environmental relationships. This introduction and all subsequent contributions share an attitude of interlacing Stieglerian lines of argumentation in a wider milieu, so as to provide a tool for navigating a complex discursive body from multiple access points.

Contextualising Stiegler's anthropotechnics

Epiphylogenesis is one of many intricate neologisms developed within Stiegler's theory of anthropotechnical evolution. In the simplest sense, it describes a form of technically conditioned co-evolution. Stiegler initially synthesised this theory in his first books, *Technics and Time 1–3,* in which he doubly re-articulated Heidegger's ontology by means of a particular conception of technology that is derived from a more anthropological angle.

Based on the work of paleoanthropologist André Leroi-Gourhan and philosopher of technology Bertrand Gille, Stiegler reclaimed the forgotten technical condition of both human beings and their evolution. The process of becoming human and the characteristics of what makes us a particular species is constituted by technics to such an extent that it cannot be understood without it. The human *is* technics. As Leroi-Gourhan argued, Western civilisation has not simply been 'modified' with the advent of machines or a set of characteristic technics. Rather, humans evolved in reciprocity with technics and technology. The human brain and the nervous system essentially evolved not just alongside, but effectively *through* the production of tools, instruments and technical artefacts. This technical co-evolution entails an 'externalisation of memory' to which all techniques and technics can be traced back.[11]

Technics and Time identifies the newly acquired mnemotechnology as the threshold of a 'higher-order' evolution. According to Stiegler, technological conditioning led to 'the appearance of a new relation between the organism and its environment'.[12] This becomes one of the central tenets of Stiegler's work. He first transposes Gille's historiographical suggestion for the history of technics into an approach to history or historical formations in general.[13] This reordering would have been impossible without Gilbert Simondon's analysis of the evolution of technical objects and ensembles that mapped systemic stabilisation and concretisation of technical lineages. Second, in elaborating what the epiphylogenetic

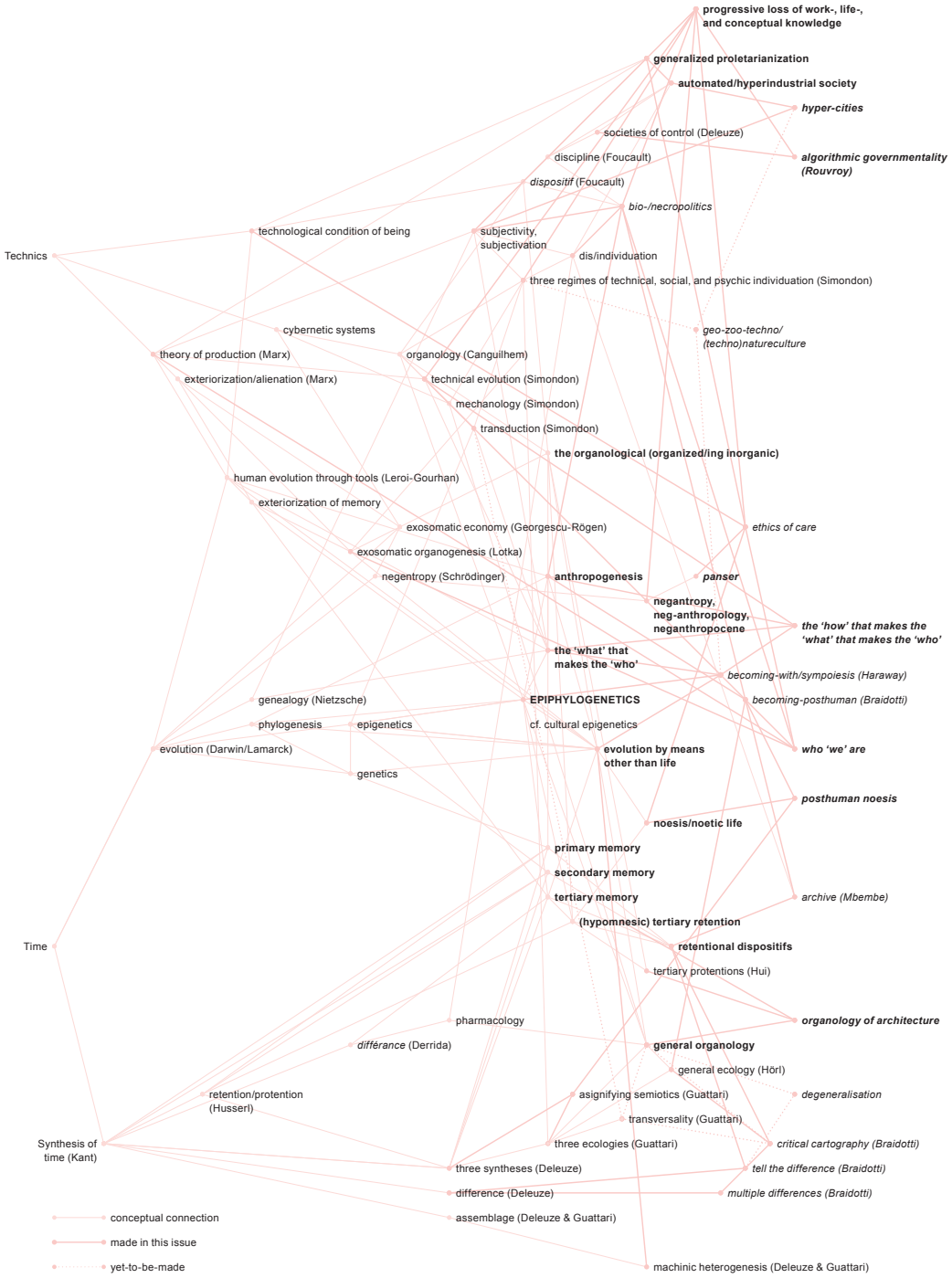


Fig.1: Conceptual network of key terms for theorising and technical co-evolution of socio-techno-environmental assemblages, within and beyond Stiegler's *Technics and Time*. Diagram: Authors.

mechanism consists in, Stiegler views technics not just as concrete material tools or entities and the ever more complex technical ensembles they historically concretised into. Under Simondon's influence he also conceives of them as things that are formed or organised *from* particular material environments in which they come to be put to use by particular life-forms that co-evolve with material technologies.

Stiegler thus reconsiders technics as an evolution of organic living 'by means [of something] other than life'.[14] This 'other' factor is located in the wider organisation of the inorganic matter of the world in which evolution traditionally takes its course, while foregrounding how it also changes its course. Life-forms such as humans are initially shaped by material environments and conditions through adaptations to ecological niches. Yet in this process they often come to re-shape their environments for their own evolutionary benefit.[15] They do so by means of concretising technical tools and ensembles to a point where technics fundamentally change the entire evolutionary dynamics.

It is here that the neologism 'epiphylogenesis' becomes indispensable for capturing the parallel evolution between 'corticalisation' and technical differentiation.[16] Humans and technics did not simply co-evolve; such an account would omit the recursive nature of this path-dependent evolution. Epiphylogenesis presents an account of the genesis of the human species (also known as anthropogenesis) and human societies *by means of* ever more complex technical systems and 'technicised' environments. Crucially, it constitutes a more general theory of how life-forms evolve *with* particular socio-techno-environmental assemblages, of which anthropogenesis is then a special case.

While uncovered in a quest to understand the specificity of human evolution, this type of higher-order co-evolution – by means of technics and organised (or technicised) environments – is certainly not something that sets humans apart in kind, but only by degree. Alluding to all kinds of constructed environments, Stiegler himself later used the example of the anthill: 'It is impossible to understand the ant without the anthill.'[17] By situating (the specificity of) human environments on an evolutionary spectrum, Stiegler in fact wards off any taint of human exceptionalism. The human is fundamentally decentred as a historical construct. Epiphylogenesis – as a broader process than anthropogenesis – reveals that there has never been such a thing as 'the human' whose genesis could be mapped in isolation, or merely 'in the environment'. Rather, the problem must be approached via co-evolution, which is structurally coupled to the evolving organisation of particular environments and their production of difference.

Before delving deeper into the details of Stiegler's work, it seems necessary to unpack the crucial aspects concerning this assemblage-theoretic account of the genesis of different life-forms, particularly humans, through certain technics, and its attempted decentring through generalisation. Concerning the first aspect, we should mention initially how epiphylogenetic thinking is inscribed into a longer trajectory of genetic approaches, from Nietzsche's genealogy of morality, to Foucault's related account on the production of modern subjectivity, to Deleuze and Guattari's theory of machinic subjectivation. The latter was especially inspired by Simondon's genetic approach to the individuation of technical objects. Simondon's perspective also aligns with those developed since Frantz Fanon's focus on sociogeny. They all share a common aim of debunking historical descriptions that merely trace what was happening. As such, representationalist methods fail to actually explain what was going on in what was happening. By contrast, genetic approaches try to map the underlying generative relationships, relations of production, and constitutive differences through which those transformations come about. One larger tenet of such anti-representationalist thinking is to stop using human agency, subjectivity, or social practices as the ground of explanation and consider them as something that begs explanation.

Instead of isolating epiphylogenesis, we can appreciate it as a strand that parallels several similar accounts. This particularly applies to posthumanist feminism with regard to socio-techno-environmental geneses, to which it can (and should) be fruitfully connected for the purpose of its reworking. In line with neo-materialist scholarship, the theory of epiphylogenesis debunks the Manichaeism of nature/culture, matter/technology, or object/subject, and complements the evolutionary notion of symbiogenesis from a technological angle. As underscored in Donna Haraway's kindred sympoietic approach to nature-cultures, things don't ever make themselves, but are always assembled in milieus of reciprocal processes of becoming (different together).[18] In this sense epiphylogenesis conceptually stands in for all forms of life that are necessarily conditioned by organisational differentiation processes that historically made us who we are (and made us so in different ways). Therein Stiegler's account resonates (albeit not yet explicitly enough) with feminist, queer and decolonial works of authors including but not limited to Rosi Braidotti, Claire Colebrook, Donna Haraway, Sylvia Wynter, Patricia Reed and Kathryn Yusoff. These scholars do not only critique 'man' as a generic construct, but also expose the all-too-general and all-too-human visions that fail to account for the more-than-human condition.[19] In line with these reproaches that stress how 'the human' is not just a historical figuration or even a social construct (to which we shall return in more detail below), epiphylogenesis decentres the human by approaching it as a technical construct. No longer opposed to nature or culture, 'technics' here is to be understood as involving all sorts of arts (*technai*), artefacts and their articulations. They include technologies of the self and technologically-related knowledges, emerging at an intersection of material-environmental, social-cultural and cognitive practices in the widest sense.

Epiphylogenesis first gained exposure in the field of media studies rather than architecture.[20] In the field of design theory it was recently picked up in Tony Fry's posthuman inquiry into 'becoming-human by design', particularly by means of environmental design.[21] It turns out that epiphylogenesis is more than an applicable design philosophy for the Anthropocene that may be coopted by the transhumanist project, from which we distance ourselves. As Heidegger had already argued, what is required is a more critical and multi-layered conception of what role 'design' plays in shaping *dasein*. Moreover, to what an extent are we even human, or made so.[22] The field of architecture has yet to fully reassert its role in subjectivation processes. The role of built spaces and technicised environments, and their material-discursive arrangements and organisations, has been somewhat overlooked even by neo-materialist and posthuman scholars, whose subject of interest is material-discursive practices and the complex ways in which technics are involved in worlding dynamics and geneses.

An extended genetic approach: epigenetics

Both Darwinism and Lamarckism failed to account for a more dynamic way in which environmental factors steer evolutionary processes. The former took differentiation to be a result of passive processes of adaptation to environmental pressures via sexual selection, while the latter thought that phenotypical differentiations are directly passed on as genotypical ones. It is beyond dispute today that evolution is in fact steered by a reciprocity that is found within processes of (adaptive) niche-construction (in fact as particular species-specific and species-constitutive behaviours) through which epigenetics and phylogeny are coupled.[23]

It is thus high time to complement the reductive Darwinian principle of natural selection with a healthy dose of neo-Lamarckian emphasis on auto-affective niche construction. The field of epigenetics has reestablished the influence of environments upon genetic aspects.[24] Whereas the genomic code may be compared to a changing 'hardware', epigenetics compares to the software – an equally changing programme written in the form of specific

chemical tags located on top of (*epi*) the genome, which regulates *how* the genetic code comes to be expressed.

As a branch of biology, epigenetics originally developed against the preformationist vision in embryonic development. It posits that organisms gradually take form through and evolve within successive differentiation processes. Epigenetic thinking as such has foregrounded generative rhythms within form-taking dynamics. In its search for the related differentiating factors of development that come to be activated within a generation (ontogeny, development) and transferred from generation to generation (phylogeny, evolution), epigenetic research revolutionises our understanding of evolution. It confirms a variety of molecular, biochemical, hormonal, physiological, behavioural, experiential and environmental factors in the modification of patterns of gene expression.[25] The way epigenetic mechanisms operate within larger evolutionary processes has only recently been captured in its multidimensionality.[26]

First, for this differentiation to take place in biology, epigenesis must necessarily be 'recapitulated'. Embryos, for instance, recapitulate phylogenetic becomings with(in) a particular environment, that is, a (bio)molecular milieu of (non) organic matter and forces from which it takes form. The milieu shapes the genesis of a body's internal organisations in a series of organising differentiations resulting in different cell-types, tissues, organs, and so on. This organisation *par le milieu* (as Isabelle Stengers would put it) continues throughout life. It is an interactive process through which a body contracts certain habits – (self) organisational patterns – by adapting to (or rather adopting) this milieu and becoming with particular habitats. These developments are guided by a structural coupling with trans-generational environments that in turn influence phylogenetic processes (that is, a longer evolution of distinct new species).

To the extent that humans are not just passively adapted to environments, but also actively modulate entire environmental systems, we are necessarily adapting by means of these anthropogenic modifications of the world while adopting them into our lives in a recursive becoming. Conrad Waddington – who is credited with coining the very notion of epigenesis – has represented this relationship with the diagrammatic idea of the 'epigenetic landscape' (what Waddington also calls the Chreod). Accordingly, an organism's development and evolution are channelled into particular pathways on a morphogenetic field, which itself is modulated by underlying epigenetic mechanisms and environmental pressures. This directed evolution is extremely difficult to grasp in its irreducibility. It does not simply determine or constrain, nor does it open up or enable becomings. It does both at once through a delicate calibration of generative and selective, or regenerative conditions.

Scholars with humanities leanings like Claire Colebrook and Catherine Malabou have promoted epigenetic thinking to problematise a middle ground, where the passive and the active meet, and revisit the middling stratifications and differentiations characterising life in their primarily productive function.[27] Conversely, biologists themselves have recently begun to expand the scope of epigenetic research to understand how cultural differences and patterns may leave their mark on evolution or reinforce replication or selection criteria.[28]

A further step: epiphylogenesis

What remains partly open, however, are the workings of these environmentally-operated mechanisms of replication, variation, and selection. In what way could culture possibly influence them unless it is recast as a quasi-causal mechanism?[29] This is precisely where epiphylogenesis tries to move a step further, in advancing a general theory of environmental engineering that ascribes cultural differences to techno-environmental lineages. Supplanting the well-known symbolic approach to the role of culture, Stiegler's macro-historical philosophy of technology problematises

the genesis within evolution in a more 'machinic' fashion.

Three million years ago a momentous change occurred within human evolution due to the appearance of a novel mechanism of inheritance by means of transmissible technical artefacts. *Technics and Time 1* (1994) is devoted to this new type of 'memory', which came to drive evolution. In addition to what he calls the primary memory – (phylo) genetic memory, that is, information expressed in the genome and the phylum of a species – and secondary memory – epigenetic memory, acquired through a complex nervous system accumulated during but not conserved beyond individual lives – Stiegler posits a third type of memory.[30] Dubbing it 'epi-phylo-genetic memory', Stiegler argues that this tertiary memory consists in the way that past epigeneses come to be accumulated and conserved within the spatio-temporal organisation of material environments.[31]

Retained in the form of an 'already-there', this third type of memory constitutes a past not lived but inherited nonetheless (in the form of a world). It is 'epiphylogenetic' to the extent that it also involves a recapitulation of the 'dynamic and morphogenetic (*phylogenetic*) accumulation of individual experience (*epi*)', which allows the transmission of epigenetically acquired knowledge 'to the phylum that is technical life'.[32] This way it couples genetic and epigenetic memory that, according to Nathan van Kamp, 'naturally' do not communicate.[33] Epiphylogenesis enacts a more artificial relationship, as this coupling forms some kind of enabling constraint through which the act of remembering becomes 'situated and therefore spatially-bounded'.[34]

Extending Husserl's phenomenology of time and its theory of 'passive synthesis' – consequently radicalised by both Deleuze and Derrida – Stiegler conceptualised the third kind of memory. These 'tertiary retentions' condition, 'at every step', the interplay between primary 'memories' and secondary 'habits' contracted by mnemonic accumulation.[35] For Stiegler, tertiary retentions are thus spatialised traces of past events, mainly in the form of tools, technical instruments, and technics. As such they are 'in the most general sense the prosthesis of consciousness without which there could be no mind, no recall, no memory of a past that one has not personally lived, no culture'.[36]

Technics and Time derives an evolutionary theory that more widely problematises a specific 'spatialisation of time' as the geneses of organisations that are utterly dependent on technics.[37] 'Organogenesis' is conceived by dynamising Leroi-Gourhan's aforementioned anthropological theory of exteriorisation and connecting it to Heidegger's ontological stance of the technological condition of being. In stark contrast to techno-determinism, the notion of epiphylogenesis posits a mutually-constitutive relation between organisms (the who) and their inorganic yet organised environments (the what) so as to reconsider anthropogenesis in its specificity. It explores how the third memory, which is 'housed outside the body through the organisation of the inorganic' affects the evolution of organic life 'by means other than life'.[38]

Stiegler argues that the first tools and art forms occurring during the Later Stone Age formed a new kind of retention in granting access to mental contents. These 'hypomnesic' tertiary retentions are responsible for an 'epiphylogenetic bifurcation' within the history of life. They allowed earlier forms of sentient life to enter a new kind of 'noetic life', sustained by specific 'retentional dispositifs' that enact particular 'regimes of individuation'.[39] As Yuk Hui notes, these include not just 'languages, the use of tools, the consumption of goods, and ritual practices', but also all sorts of non-human others, starting with, in Rosi Braidotti's words, 'organic animals, plants, and the entire planet', as well as 'inorganic entities, such as technological artifacts, networks, codes, and algorithms', as they form a 'vital web of complex interrelations.'[40] In critically developing Stiegler's early work, Hui highlights the need to understand those dispositifs not only as historically 'organised inorganic' objects or systems.

To apprehend the peculiar recursivity that characterises dynamic systems, they must be understood as an 'organis*ing* inorganic' that enacts 'tertiary protensions'.[41]

In resonance with Foucault's genealogies that trace emergent subjectivities, here we identify the complex task of epiphylogenetics in tracing how *noesis* is conditioned by retentional dispositifs. Similar to how epigenetic mechanisms act upon gene expression, epiphylogenetics studies the ways in which environmental organisations act upon the unfolding of phyl(ogen)etic processes (such as anthropogenesis) to the extent that it radically changes the conditions for organogenesis. The accumulated 'epigeneses exert a powerful counter-effect on the reproduction of the species' as they channel 'the transformative conditions of "selection pressure"'.[42] Such a conception of selection, Luciana Parisi notes, understands the metastable feedback loops between entities and their environment.[43] Reconsidered from the sympoietic angle characteristic of Haraway's work, this feedback loop consists in a symbiogenetic 'becoming-together-with environments' and it must be understood as a particular kind of syn-techno-genesis. Concerning these co-constitutive dynamics, technics (in terms of Simondonian technical lineages and Deleuze-Guattarian machinic phyla) gain an analytical primacy over the social and mental individuations that epiphylogenetic bifurcation brings about.

From one theory to two-fold reading

The third volume of *Technics and Time* replaced the notion of externalisation with the term 'exosomatisation', adapted from biologist Alfred Lotka and (bio)economist Nicolas Georgescu-Roegen, who reframed it in relation to Marx.[44] In 1945, Lotka noted that, through the production of externalised, inorganic organs presented by technical objects, evolution started to follow an entirely new exosomatic path 'in place of slow adaptation of anatomical structure and physiological function in successive generations by selective survival'.[45] 'Exosomatic evolution' as a process contrasts with (or complements) the type of endosomatic organogenesis that biology is traditionally concerned with. Attending to the progressive externalisation of our faculties into artificial organ(isation)s, according to Stiegler, has profoundly altered our understanding of

> organogenetic process through which the organism noetizes itself by endowing itself with inorganic organs. If vegetative and sensitive life is what constantly evolves through the *endosomatic organogenesis* … noetic life is characterized by an exosomatic organogenesis, that is, by the production of artificial organs without which it could not live.[46]

Based on Simondon's kindred genetic approach to the individuation of technical objects, Stiegler further elaborates a process of co-individuation, or 'transindividuation', driven by the genesis of 'exosomatic organs' ('ex-organs') that further 'ex-organise' the evolution of life by means other than life. It is in this sense that exosomatic organogenesis (ex-organogenesis) leads from an *Umwelt* to a *Welt* and finally to what Heidegger called *Gestell*.[47] This is an approach that one could easily associate with Foucauldian apparatuses (*dispositifs*) or Deleuze-Guattarian assemblages (*agencements*), which maintain the externality of relations. Here evolutions continue to get extrinsically organised ('ex-organised') by concretising technics, their associated technicised milieus and machinic phyla, as they co-evolve into a more-than-human system that selects for complex ex-organisms sustained by larger technical ensembles. In contrast to the endo-symbiotic drift that characterised the progressive complexification of cellular life, the system effectuates an 'exosomatic drift' characterised by the progressive reticulations of technically mediated forms of life. Placing Spinoza's question of knowing 'what a body can do' in a new light, Stiegler points out that

> *to this day, science has no complete theory of exosomatization*, that is, of the process by which noetic life

> constantly augments its power to act through artifices that are always also, however, what diminish its power to act, even to disintegrate it, annihilate it and, ultimately, completely destroy it.[48]

As we may not know in advance what an exosomatic theory of organisation might do, we have to suspend interpretation by elaborating a new heuristic. With this aim, Stiegler outlines a general theory of organisation, which calls an 'organology' in a spirit akin to Simondon's 'mechanology' and in conformity with his thesis supervisor Georges Canguilhem's use of the word.[49] This theory contradistinguishes organisms from 'the organological' that, comprising all inorganic yet organised matter, forms their basis. In contrast to cybernetics, organology thus does not just include technology as some exorganological reality; it is analytically grounded on an explicitly exosomatic conception of technical forms of life and the possibility of a particular type of retention that characterises anthropogenesis. The latter was absent from all earlier genetic approaches.[50] With this extrinsic conception, a wider approach may be analytically geared at understanding the more or less individuating powers of any form of organisation. By problematising the direction that specific technical systems tend to evolve towards, Stiegler pushes his organological approach towards a mode of study that Derrida had called 'pharmacological'. By approaching ongoing technological transformations as a double-edged sword, Stiegler carefully avoids falling into either the technophiliac embrace of techno-determinism, or the technophobic rejection of any techno-mediation whatsoever (by focusing, for instance, on social practices).

Stiegler's multiple pharmacological studies demonstrate that the externalisation of memory into technics and technicised environments constitutes 'an unconscious, if not the unconscious'.[51] They also expound a specific forgetting or unawareness, if not outright technological illiteracy, against which we need to re-cultivate a way of engaging with the evolving systems, always on the basis of – yet also against – their auto-piloting tendencies. Stiegler's *Automatic Societies* (2015) warn that the 'long circuits' of psychosocial transindividuation have become increasingly 'short-circuited' due to higher degrees of automation and algorithmic governance since the beginning of the industrial and 'hyperindustrial' age. This tendency has incrementally led to a 'generalised proletarianisation' and 'systemic stupidity' produced through a wider deprivation of knowledges; the successive eradication of many forms of *savoir-faire*, *savoir-vivre*, and *savoir-théoriser*.[52]

The ambition to recalibrate such disindividuating relationships into more empowering becomings led Stiegler to the question of entropy and in particular to Schrödinger's notion of negative entropy.[53] Negentropy, as it is commonly abbreviated, describes phenomena of local delimitation and deferral countering the overall effects of entropy as an irreversible dissipation of energy. Since its introduction it has been generalised to explain not just ordered structures, but in particular living structures and informational systems. Under the influence of Nicholas Georgescu-Roegen, Stiegler realised that 'a theory of exosomatic organogenesis is ultimately built on the theory of negative entropy'.[54] His subsequent study, titled *Neganthropocene* (2018), further transposes organology into a kind of 'neg-anthropology' that counteracts not just the increasingly disindividuating effects of (hyper-)automation, but also a much larger techno-environmental condition of the Anthropocene as a highly entropic age (*en*tropocene) with toxic effects.[55] To avoid confusion with a 'negative anthropology', Stiegler calls for a 'neganthropology' centred on a novel understanding of the 'neganthropy' within anthropogenic systems. The neologism designates a remedying project that depends on enacting new economies of care, including new forms of governance. Aligning with projects such as that of María Puig de la Bellacasa, Stiegler constructs a care-full account of the organisation of anthropogenic systems.[56] This new ethics is meant to help negotiate 'new world futures' as Fry

would put it.[57] It is in this respect that epiphylogenesis becomes important to genealogically locate the origins of contemporary (dis)individuating effects of organisations, their makeup, and design in order to *care*-fully and response-*ably* engage within ongoing transformations.

From two-fold reading to three-stranded approach

Stiegler had started to sketch the outlines of a 'general organology' in his eponymous contribution to Erich Hörl's reframing of the organisation of built environments in terms of a *General Ecology* (2019), as well as in another article called 'Elements for a General Organology' (2020). Both writings attempt to establish a theory that conceives of technical life as an evolutionary process that is psycho-socio-techno-logical, whereby 'the relationship between the organic and the organological [ough to be seen as] what Simondon calls transductive.'[58] To study these transductive relations, general organology proposes a transdisciplinary methodology, where the term 'general' designates a wider transindividuation effectuated on the 'three planes of organological becoming'.[59] The approach presupposes a particular type of recursivity between the organic and inorganic which does not stop at totalising feedback loops within closed systems.

Similar to the Deleuzo-Guattarian notion of assemblages, organology problematises a more complex systemic consistency and closure that gives rise to emergent systems.[60] By mechanologising Guattari's *Three Ecologies* qua Simondon, Stiegler arrives at a three-stranded cord designed to pharmacologically map the transductive relations of environmental, social, and psychic individuations within past and ongoing technological developments.

If we wanted to draw a brief genealogy of the three-stranded theory, we are initially referred back to Deleuze's overcoming of Husserlian phenomenology by his reworking of Kant's 'three syntheses' in *Difference and Repetition* (1968). Further developed in Deleuze's *Logic of Sense* (1969), this approach was synthesised in collaboration with Guattari on *Anti-Oedipus* (1972) and its tripartite theory of the machinic production of subjectivity that centred on a renewed understanding of processes of 'inclusive disjunction'. In his solo work, Guattari would reformulate the tripartite theory into the irreducibility of the aforementioned environmental, (bio)social, and (psycho)mental ecologies.

Its genealogy is significant for our purposes in two ways. First, it is here that Stiegler's line of thinking greatly converges with that of many architecture theorists – including among many others Hélène Frichot, Peg Rawes, and Andrej Radman – who have drawn on Guattari's work to reconceptualise architecture and built environments as relational ecologies of creative/transformative practices.[61] In their view architecture is located at the intersection of these three distinct but inseparable collective, psychological and environmental domains through which, as Peg Rawes writes, 'subjectivity and our habits, habitats, and modes of inhabitation are co-constituted'.[62] From such a viewpoint it could be argued that Stiegler's mechanologisation – insofar it concerns the 'arranging [of| the various processes of psychic and collective individuation … via technical individuation'[63] – may too hastily have conflated material/environmental ecologies and their organisation with technical objects.

Attempting to further generalise the (ex) organogenetic function of spatialisations in the epiphylogenetic turn, we first want to suggest that spatial design, architecture and urban planning, in their capacity as large technical ensembles with various instrumentalisations, ought to be added to the list of epiphylogenetic technics, and perhaps at its top. In *The Extended Self*, Chris Abel reproaches Stiegler for initially ignoring architecture in its capacity as a basic technology.[64] Later, Stiegler did recognise at least 'urban

morphogenesis … as an exosomatisation constituting all kinds of exosomatic exorganisms, such as … specific functional architectures … [and] functional concentrations of organism that are themselves exosomatic'.[65] Urging us to think 'the city starting from the concept of exosomatization as the pursuit of organogenesis', he thus understands the city as an assemblage of nested exorganisms.[66]

Concerning such an assemblage-theoretic reading, we wonder: Are built environments not the most obvious example of 'evolution by other (inorganic) means'? Is architecture not the first of all arts (*technai*) among the technical tools and ensembles that epiphylogenetically ex-organise 'worldings'? Paraphrasing Vicky Kirby, could we not say that cultures were perhaps just technicised environments all along?[67] The mantra that the 'what' invents the 'who' just as much as it is invented by it, was anticipated in Churchill's remark that 'we shape our buildings; thereafter they shape us'. Put bluntly, 'the built environment has no other purpose but to transform us'.[68] This urges us to carefully rethink how environmental formations like architecture technically operate within ontogenetic processes. Reconsidering the *what* of technicity as constitutive of the (post)human *who*, and not merely the other way around, implies a radical recasting of the architectural discipline after the epiphylogenetic turn. Breaking the trinary opposition of nature, culture, and technology, we see the epiphylogenetic turn as the path-breaking component within the wider convergence of three stands of study where architecture and spatial design are located.

Such an approach may help reinvigorate the ongoing efforts towards an urgently needed reconceptualisation of constructed ecosystems and worlding dynamisms from a more technological (organo-/mechano-logical) angle. Placing architecture at the intersection of three worlding dynamics opens up a timely opportunity to reclaim for it a vanguard position, against its relegation to a mere instrument of control and compliance with no potential for social reform. It is necessary to adopt an experimental attitude that turns architecture (as an ecology of practices) into an art of dosages.

This brings us to another aspect concerning the Guattarian genealogy. Perhaps the principal point of such a pharmacological (and in fact Spinozist) general organology of architecture lies in experimentally elaborating a 'general ecology of alternative ways of becoming subjects', as Braidotti puts it, to argue how this general organology may serve as a tool to navigate the contradictory forces of the present.[69] It is with this aim that we conclude by problematising another crucial point.

Not-too-general accounts of how the what determines the who

Evidently, Stiegler has not gone far enough in deconstructing the general reorganisation of exosomatic organs and organogeneses from an entropic into a newly negentropic configuration. What we miss is the specific direction to be taken in this countering move. As entropy is often associated with disorder and negentropy with 'order', there is a danger of misinterpreting Stiegler's organological call to order. For as long as we stay on a too-general level, it will be impossible to figure out what order(ing) we are referring to. Here generic typologies and classifications must give way to (epiphylo) genetic topologies and meshworks.

Again, we turn to posthuman feminism for guidance. Its most prominent advocate, Rosi Braidotti, also understands the present condition as a convergence of three changes: social, environmental, and technological, as articulated in our epigraph. Her cartographic work, which draws together a thousand works and voices, radicalises the mutual imbrications and inextricable linkages of matter-geo-environmental, zoo-bio-social, and noo-technical becomings 'to such a degree that it is impossible to tell them apart'.[70] Starting here with a (too-)general notion of transindividuation between the human and geo-zoo-techno-environmental

systems proves problematic, especially when extended into a transhumanist framework that uncritically maintains a particular template for human evolution (crypto-anthropocentrism). As Braidotti maintains, the challenge for critical theory is to distinguish between different mutations. She calls for more transversal ways of cutting across and desegregating established categories and fields of knowledge by 'making affective connections across the ecological, the social, the technological, and other domains.'[71]

Braidotti's transversal perspectives decentre the discursive hegemony of *anthropos* (Western man) by means of alternative visions of the post- or better, more-than-human, elaborated through more situated accounts of subjects that have long been excluded from this category. Her critical cartographies map past and ongoing becoming in terms of sexualised, gendered, racialised, and naturalised differences of oppositional otherness according to which 'difference from' always means 'being less than'.[72] In other words, these differences are organised into intersecting hierarchical systems of discrimination that dehumanise people with reference to a particular historical construct of 'man'.

Such situated perspectives underline the need to de-generalise Stiegler's conceptual toolkit through heavy doses of minor – feminist, queer, decolonial, and critical race – theories that compensate for its implicit Euro- and andro-centric universalising tendencies and neo-humanist leanings. For instance, Kathryn Yusoff's decolonial notion of anthropogenesis far more adequately reveals the extent to which different techniques also make us differently human, while Alexander Weheliye's work demonstrates how technical ensembles that form 'hierarchising assemblages' may dehumanise us to differing degrees and in different ways.[73] Often a matter of life and death, these *dis*individuating technological factors have more complex and concatenated (epi-phylo-)genealogies that require more nuanced problematisation of the variables that determine present mutations. As Achille Mbembe points out, there is no biopolitics without a necropolitical lining.[74]

There is a clear need to carefully rethink the 'general' aspect of organisations. The 'general organology' may be taken as a broader call for an assemblage-theoretical study into the specifics of *how* particular forms of life such as humans have co-evolved differently – through historical time, culture, age, class, gender and ability – and continue to co-evolve with certain technics, technicised environments, technologies of the self and of power. The concern brings epiphylogensis closer to what Deleuze and Guattari called 'machinic heterogenesis'.

As Stavros Kousoulas implies in his contribution to this issue of *Footprint*, Stiegler may have overlooked the 'how' that initially determines the 'what' determining the 'who'. We hope the multiple mappings of epiphylogenetic processes in the various contributions may provide the reader with new conceptual and methodological lenses to help analyse, understand and reconfigure what we are ceasing to be and who we are capable of becoming. Resonating with Braidotti's posthuman feminism, Claire Colebrook opens the issue by expounding on the 'problem of epiphylogenesis', namely what it does and demands from 'us'. The notion of a tertiary memory – making us possible by means of something else (like external technologies) – shifts the problem concerning present technological conditions and ecological crises that we are facing. Instead of a lament 'about what we can do', Colebrook employs epiphylogenesis to turn toward the very possibility of this 'we'. Her 'Speculative Architecture' is a call for affirmative action in the creation of new forms of thinking and knowing that may experimentally reconfigure the toxic historical archives and the disindividuations they entail, in the direction of more empowering becomings.

Subsequently, Georgios Tsagdis further explores the 'Architectures of Thought'. He suggests supplementing the genetic structural framework of

Stiegler's neganthropological project with a metabolic plane of analysis that highlights the ephemeral dimension and dynamic reciprocity within transductive relations. Upon revisiting Kant's architectonics of pure reason and the schematisation within cinematic consciousness, the article discusses the late-Marxian lineage on which Stiegler conceived the production of *noesis* as a consciousness conditioned through technical exosomatisation. Tsgadis takes this as a point of departure to elaborate how there is no 'individuated self before architecture' and how 'the self is rather constituted "through an experience of spacing that is already marked by an existing architecture"'.

A quite different type of this production of *noesis* beyond the human, is suggested by Jacob Vangeest's discussion of asignifying semiotics within forests. In expanding the neganthropological consideration of thinking as care (*panser*) through eco-feminist notions of care, the article reciprocally extends existing approaches concerning plant intelligence through the work of Peirce and Deleuze and Guattari. It provides an alternative formulation of epiphylogenetic memory demonstrated by a case study of the semiotic chain in response to fires in redwood forests on the west coast of the US.

Davide Landi concentrates on Stiegler's idea of hyperindustrial societies and investigates the particular epiphylogenetic function of increasingly immaterially-organised 'hyper-cities'. He problematises the longstanding formal analogy between bodies and buildings in order to investigate the complex contemporary relationships between posthuman bodies and the growing interpenetration of digital and physical realms. The article evidences the radical environmental, social, and psychological transformations brought about by infrastructural networks and their increasing digitisation, connectivity and data production, and it calls for pharmacological studies of the effect of technologies.

Having already investigated the trans-aspects of architecture in previous issues of *Footprint*, Tim Gough closes the peer-reviewed articles section by elaborating the idea of a transductive architecture. In investigating 'what an organology produces', he revisits Le Corbusier's design of the Villa Savoye (and its compositional play) as a 'tertiary protension that responds to then tertiary retentions of baroque and neo-classical Paris'. In so doing, Gough points to several profound changes that this notion implies, namely how architecture is conceptualised organologically and transductively, and what this vision concerns the ways in which we become-with architecture.

In their combined contribution, Gökhan Kodalak and Stavros Kousoulas review, from two opposing angles how Stiegler's work makes sense in advancing and helping promote Simondon's genetic approach to technics and individuation, which has only recently attracted attention in architectural discourse. Chris Smith reviews through Marx and Engels some forethoughts and afterthought concerning *Technics and Time*'s notion of the organised inorganic in two projects by Neil Spillers.

In an interview with Antoinette Rouvroy, Lila Athanasiadou and Goda Klumbytė revisit Guattari's 'Three Ecologies' and discuss their dynamics in the digital age. While a lot of the discourses on algorithms and the digital future invoke catastrophic imagery of totalising control, this conversation works with a propositional format, teasing out affirmative politics by pointing to spaces of potentiality within the environmental, the social and the mental realms.

The issue closes with two techno-mediated individuations in the form of visual essays. The first is curated by Agnieszka A. Wołodźko, who transindividuates herselves in an affective trans-species becoming – mystagogy and demonology. Her *Ars Daemones* manifesto is written through the experience of vegetariat in the work of Špela Petrič, transbodies and xenologies in the work of Adriana Knouf and the practice of virophilia in the work of Pei-Ying Lin. Setareh Noorani has the final word. Her contribution – which loops with Colebrook's

opening article – problematises Western archives as hegemonic tertiary retentions and proposes ways of constructing long overdue alternatives that enact a continuation of life by means other than life and multiple life-constituting others.

Notes

1. Rosi Braidotti, *Posthuman Feminism* (Cambridge/ Medford: Polity, 2022), 3–4.
2. Achille Mbembe, interviewed by Nils Gilman, 'How to Develop a Planetary Consciousness', *Noema Magazine,* 11 January 2022, https://www.noemamag.com/how-to-develop-a-planetary-consciousness/?fbclid=IwAR17lt0TSex_jnfoCnBnLO8Es_DIryAc_cBbHeDQ2hBayLk0hZjn8Q2vVws.
3. See, for instance, Ross Abbinnett, *The Thought of Bernard Stiegler: Capitalism, Technology and the Politics of Spirit* (London Routledge, 2019); Christina Howels and Gerald Moore, eds., *Stiegler and Technics* (Edinburgh: Edinburg University Press, 2013); Noel Fitzpatrick, Neil O'Dwyer and Michael O'Hara, eds., *Aesthetics, Digital Studies and Bernard Stiegler* (London: Bloomsbury Academic, 2021).
4. See the translator's note on the recurrent terms 'technics,' and 'technology,' in Bernard Stiegler, *Technics and Time, 1: The Fault of Epimetheus*, trans. Richard Beardsworth and George Collins (Stanford: Stanford University Press, 1989 [1994]), 280–81. Some of these points were also addressed in *Footprint* 12, no. 1, 'The Architecture of Logistics' (2018).
5. Besides the aforementioned first volume, see Stiegler, *Technics and Time, 2: Disorientation*, trans. Stephen Barker (Stanford: Stanford University Press, 2009 [1996]); *Technics and Time, 3: Cinematic Time and the Question of Malaise*, trans. Stephen Barker (Stanford: Stanford University Press, 2011 [2001]). Stiegler intended a continuation of the *Technics and Time* trilogy. The draft for a fourth volume was published posthumously as *Technics and Time 4: Faculties and Functions of Noesis in the Post-Truth Age*, trans. Daniel Ross (2021), https://www.academia.edu/58785373/Stiegler_Technics_and_Time_4_Faculties_and_Functions_of_Noesis_in_the_Post_Truth_Age.
6. Stiegler: *Technics and Time* 1, 177.
7. Books in which Stiegler explores our present technological condition and politics along a more genealogical trajectory include: *Automatic Society, 1: The Future of Work*, trans. Daniel Ross (Cambridge: Polity, 2016 [2015]; *Symbolic Misery, 1: The Hyperindustrial Epoch*, trans. Barnaby Norman (Cambridge: Polity, 2014 [2004], *Symbolic Misery, 2: The katastrophē of the Sensible*, trans. Barnaby Norman (Cambridge: Polity, 2015 [2005]; *The Decadence of Industrial Democracies: Disbelief and Discredit 1*, trans. Daniel Ross and Suzanne Arnold (Cambridge: Polity, 2011 [2004]; *Uncontrollable Societies of Disaffected Individuals: Disbelief and Discredit 2*, trans. Daniel Ross (Cambridge: Polity, 2012 [2006]); and *The Lost Spirit of Capitalism: Disbelief and Discredit 3*, trans. Daniel Ross (Cambridge: Polity, 2014 [2006]).
8. This is presented in books like *Qu'appelle-t-on panser? 1: L'immense régression* (Paris: Les liens qui libèrent, 2018); *Qu'appelle-t-on panser? 2: La leçon de Greta Thunberg* (Paris: Les liens qui libèrent, 2020); *The Negantropocene*, trans. Daniel Ross (London: Open Humanities Press, 2018); and his Nanjing Lectures, trans. Daniel Ross (London: Open Humanities Press, 2020).
9. Stiegler: *Technics and Time* 1, 80.
10. Stiegler sees technics not just as concrete, material tools or entities and the ever-more complex technical ensembles they historically concretise into. Based on Simondon's work, he also conceives of them as things that are formed or organised from particular material environments in which they come to be put to use by particular life-forms that co-evolve with evolving technics. Like humans, these life-forms are initially shaped by material environments and conditions through adaptations to ecological niches. Yet in this process they often come to re-shape their environments for their own evolutionary benefit, to a point where technics fundamentally change these evolutionary dynamics. Explaining these technically-transformed dynamics is one of the central tenets of Stiegler's work.

11. See Andre Leroi-Gourhan's still untranslated books *L'homme et la matière* (Paris: Albin Michel, 1943); and *Milieu et techniques* (Paris: Albin Michel, 1945); see also Leroi-Gourhan, *Gesture and Speech* (Cambridge, MA/London: MIT Press, 1993 [1964–65]). Here, Stiegler, *Technics and Time* 1, 43, and also Yuk Hui, *The Question Concerning Technology in China: An Essay in Cosmotechnics* (Falmouth: Urbanomic, 2016), 216.
12. Stiegler, *Technics and Time* 1, 177.
13. Ibid., 29.
14. Ibid., 17, 135.
15. This is a process that biologists refer to as adaptive niche construction.
16. Stiegler, *Technics and Time* 1, 140–41, 175–79.
17. Pieter Lemmens in an interview with Stiegler, 'The System Does Not Spark Pleasure Anymore', *Krisis* 1 (2011): 35.
18. Donna Haraway, *Staying with the Trouble*: *Making Kin in the Chthulucene* (Durham, NC: Duke University Press, 2016).
19. We refer here especially to Rosi Braidotti, *The Posthuman* (Cambridge: Polity, 2015) and Kathryn Yusoff*, A Billion Black Anthropocenes or None* (Minneapolis: University of Minensota Press, 2018).
20. Belinda Barnet, 'Technical Machines and Evolution', *ctheory.net* (2004), https://journals.uvic.ca/index.php/ctheory/article/view/14545/5392; Belinda Barnet and Andrés Vaccari, 'Prolegomena to a Future Robot History: Stiegler, Epiphylogenesis and Technical Evolution', *Transformations* 17 (2009), http://www.transformationsjournal.org/wp-content/uploads/2017/01/Vaccari-Barnet_Trans17.pdf.
21. Tony Fry, *Becoming Human by Design* (London: Berg, 2012).
22. Beatriz Colomina and Mark Wigley, eds., *Are We Human: Notes on an Archaeology of Design* (Zurich: Lars Müller, 2016).
23. John Odling-Smee, 'Niche Inheritance: A Possible Basis for Classifying Multiple Inheritance Systems in Evolution', *Biological Theory* 2, no. 3 (2007): 276–89.
24. Bruce Wexler, 'Shaping the Environments that Shape Our Brains: A Long Term Perspective', in *Cognitive Architecture: From Bio-Politics to Noo-Politics*, ed. Deborah Hauptmann and Warren Neidich (Rotterdam: 010 Publishers, 2010), 144–69.
25. Adam Scarfe, 'Epigenetics, Soft Inheritance, Mechanistic Metaphysics, and Bioethics', in *Beyond Mechanism: Putting Life Back into Biology*, ed. Adam Scarfe and Brian G. Henning (Lanham: Lexington Books, 2013), 372–3; Brian Hall, 'Epigenesis, Epigenetics, and the Epigenotype: Toward an Inclusive Concept of Development and Evolution,' in Scarfe and Henning, *Beyond Mechanism*, 348–71.
26. See especially Eva Jablonka and Marion J. Lamb, *Evolution in Four Dimensions: Genetic, Epigenetic, Behavioral, and Symbolic Variation in the History of Life* (Cambridge, MA: MIT Press, 2005).
27. See for example Claire Colebrook, 'Epigenesis and Outside', in *Deleuze and Evolutionary Theory*, ed. Michael J. Bennett and Tano S. Posterano (Edinburgh: Edinburgh University Press, 2019), 159–82; or Catherine Malabou, *Before Tomorrow: Epigenesis and Rationality*, trans. Carolyn Shread (Cambridge: Polity 2016).
28. See especially Eva Jablonka, 'Cultural Epigenetics', *The Sociological Review* 64, no. 1_suppl. (2016): 42–60. Cf. Alex Head, *Richochet: Cultural Epigenetics and the Philosophy of Change* (Oslo: Ljå Forlag, 2021).
29. Andrej Radman, 'Allagmatics of Architecture: From Generic Structures to Genetic Operations (and Back)', in *Contingency and Plasticity in Everyday Technologies,* ed. Natasha Lushetich, Iain Campbell and Dominic Smith (London: Rowman and Littlefield, forthcoming).
30. See also Bernard Stiegler, 'Elements for a General Organology', *Derrida Today* 13.1 (2020): 72–94.
31. Stiegler, *Technics and Time* 1, 140 and 177.
32. Ibid., 177; Stiegler, 'Elements for a General Organology', 83.
33. Nathan Van Camp, *Redesigning Life: Eugenics, Biopolitics, and the Challenge of the Techno-Human Condition* (Bern: Peter Lang, 2015), esp. ch. 5.

34. See Stephen Loo's introduction 'Technics, Memory, and the Architecture of History' to *Interstices* 13 (2012): 4–10.
35. Tertiary retention is called 'tertiary' because it conditions the relationship between what Husserl distinguished in *On the Phenomenology of the Consciousness of Internal Time* as 'primary retentions' (made on the basis of certain criteria, which are also the synthesis of apprehension) and 'secondary retentions' (itself the condition of the concept of understanding taking hold of it), that are former primary retentions or selections, which have subsequently become memories; the accumulation of which engenders habits. Those are not just psychic but also social or collective, that can be shared, and as such forming a transmittable knowledge 'how to'; and it is this past experience that thus shape expectations and anticipations of future events, that – through *krisis* – can establish their own selection criteria (like desires), which he conceptualised as 'secondary protentions'. According to Stiegler, there is a critical play between the psychic and collective secondary retentions and protentions through which a particular epoch is formed, and which constitute particular processes of transindividuation. *Technics and Time 1* was an attempt at showing that this critical play 'is always conditioned, at every step, by tertiary retentions'. For 'The taking hold of primary retention by secondary retention involves a selection, and the latter operates according to the ways that tertiary retention affords possibilities to secondary retention of "schematising" primary retentions – and, in so doing, of selecting them' (Bernard Stiegler, *The Negantropocene* (2018), 93–94). Paraphrased after Stiegler's talk on 'The Post-Truth Era', *Truth, Fiction, Illusion: Worlds & Experience* Conference, at Klagenfurt University, Austria, May 29 – June 2, 2019.
36. Stiegler, *Technics and Time* 3, 39.
37. Yuk Hui, *Recursivity and Contingency* (London: Rowman & Littlefield, 2019), 203.
38. Stiegler, *Technics and Time* 3, 206.
39. Stiegler, *The Negantropocene,* 157.
40. Hui, *Question Concerning Technology*, 216; Braidotti, *Posthuman Feminism*, 69 and 191.
41. Yuk Hui, *On the Existence of Digital Objects* (Minneapolis: University of Minnesota Press, 2016), chap. 6; Hui, *Recursivity and Contingency*, chapter 2 and 3. On the Husserlian notion of protention, see note 35 above. See also Gough's article in this issue.
42. Stiegler, *Technics and Time* 1, 177; idem, *Technics and Time* 3, 206.
43. Luciana Parisi, *Abstract Sex: Philosophy, Bio-Technology and the Mutations of Desire* (New York: Continuum, 2004), 53.
44. Alfred J. Lotka, 'The Law of Evolution as a Maximal Principle', *Human Biology* 17 no. 3 (1945), 188 and 192; cited after Stiegler, *Technics and Time* 4, 24f.
45. Lotka, 'The Law of Evolution as a Maximal Principle', *Human Biology* 17:3 (1945), 188; cited after Stiegler, *Technics and Time* 4, 25 n26.
46. Stiegler, *Technics and Time* 4, 61–62 [italics original].
47. Stiegler, *The Negantropocene,* 64 and 118; idem, *Technics and Time* 4, 47.
48. Stiegler, *The Negantropocene,* 217; idem, *Technics and Time* 4, 47, [emphasis in original].
49. Georges Canguilhem, 'Machines and Organism', in *Incorporations*, ed. Jonathan Crary and Sanford Kwinter (New York: Urzone, 1992), 45–69. Cf. 'Elements for a General Organology'.
50. Stiegler, *Technics and Time* 4, 223.
51. Stiegler, *For a New Critique of Political Economy*, trans. Daniel Ross (Cambridge/Malden: Polity, 2010), 8.
52. How to produce (work-knowledge), how to live (life-knowledge); and how to think (conceptual-knowledge).
53. In his lecture 'What is Life?', Erwin Schrödinger showed that every form of life is the local formation of a counter-entropic tendency effectuated through the organization of life. Repr. as *What is Life?, with Mind and Matter and Autobiographical Sketches* (Cambridge: Cambridge University Press, 1992). Stiegler, *The Negantropocene,* 36ff.
54. Stiegler, *Technics and Time* 4, 63–65.
55. Stiegler, *The Negantropocene,* 34–63.

56. For a comparative overview on ethico-aesthetic models of care, see Joke Brouwer and Sjoerd van Tuinen, *To Mind is to Care* (Rotterdam: V2, 2019). Stiegler's book *Qu'appele-t-on panser*, 2 vols (2018/20), revive in a Derridaean move, the older French terms *panser* (to care) in connecting it to *penser* (to think).
57. Fry, *Defuturing: A New Design Philosophy* (London: Bloomsbury, 2020 [1999]).
58. Stiegler, 'Elements for a General Organology', 73–74; and idem, 'General Ecology, Economy, and Organology,' in *General Ecology: The New Ecological Paradigm*, ed. Erich Hörl with James Burton (London: Bloomsbury, 2017), 129–50.
59. Stiegler, *The Negantropocene,* 45.
60. On the genealogy of this concept coined by Georges Canguilhem, via Descartes, Kant, and Bergson, see Hui, *Recursivity and Contingency*, ch.3.
61. See for instance Peg Rawes (ed.), *Relational Architectural Ecologies: Architecture, Nature, Subjectivity* (London/New York: Routledge, 2013); Hélène Frichot, *Creative Ecologies: Theorizing the Practice of Architecture* (London: Bloomsbury, 2019); Andrej Radman, *Ecologies of Architecture: Essays on Territorialisation* (Edinburgh: Edinburgh University Press, 2021).
62. Rawes, *Relational Architectural Ecologies*, 10.
63. Stiegler, *The Negantropocene,* 122.
64. Chris Abel, *The Extended Self: Architecture, Memes, and Minds* (Manchester: Manchester University Press, 2014), here 66–71.
65. Stiegler, *The Negantropocene,* 120.
66. Ibid.
67. Vicky Kirby, 'Natural convers(at)ions: Or what if culture was nature all along?,' in *Material Feminisms*, eds. Stacy Alamo and Susan Hekman (Bloomington: Indiana University Press, 2008).
68. Radman, 'Ecologies of Architecture,' in *Posthuman Glossary*, eds. Rosi Braidotti and Maria Hlavajova (London: Bloomsbury, 2018), 117–20; here 118-9, in reference to Sanford Kwinter, 'Neuroecology,' 313.
69. Braidotti, *Posthuman Feminism*, 237.
70. Ibid., 131–34.
71. Ibid., 9 and 103.
72. Rosi Braidotti, *Nomadic Subjects: Embodiment and Sexual Difference in Contemporary Feminist Theory* (New York: Columbia University Press, 1994), 147.
73. Kathryn Yusoff, 'Anthropogenesis: Origins and Endings in the Anthropocene,', *Theory, Culture & Society* 34, nos. 2–3 (2017): 105–27; and Alexander Weheliye, *Habeas Viscus: Racializing Assemblages, Biopolitics, and Black Feminist Theories of the Human* (Durham/London: Duke Univbersity Press, 2014).
74. Achille Mbembe, 'Necropolitics,' trans. Libby Meintjes, *Public Culture* 15, no.1 (2003): 11–40, and idem, *Necropolitics*, trans. Steven Corcoran (Durham/London: Duke University Press, 2019).

Biography

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Andrej Radman has been teaching design and theory courses at the TU Delft Faculty of Architecture since 2004. A graduate of the Zagreb School of Architecture in Croatia, he is a licensed architect and recipient of the Croatian Architects Association Annual Award for Housing Architecture (2002). Radman received his master's and doctoral degrees from TU Delft and joined the Architecture Philosophy and Theory group as assistant professor in 2008. His research focuses on new-materialist ecologies and radical empiricism. Radman's latest publication is *Ecologies of Architecture: Essays on Territorialisation* (Edinburgh University Press, 2021).