‘Green’ or ‘plant material’ has become commonplace in contemporary architectural design, as it serves to demonstrate a certain ‘ecological awareness.’ However, using vegetation as a symbol only implies its instrumentalization, that is, to ‘objectify’ living beings of another species. From this dilemma, the following text proposes a new way to incorporate vegetation into design: instead of adding green, design with it.

Notions of change in architecture and a desire to make the static building responsive to or resemble dynamic systems have characterized experimental architecture since the middle-late twentieth century. Whether it be wobbly inflatable structures (like the Utopie group), events or performances (Fluxus or the Situationists), design generation processes (La Villette competition), or building technology (Hi-Tech), architecture has been trying to find ways to be physically animated and engaged with the natural and cultural world. Plants are a key part of this ambition, notably in roof, wall, hanging, or terrace gardens. But how do we

**Keywords**
- Landscape architecture
- Infrastructure
- Instrumentality
- Essay
- Vegetation

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**FIG. 1** Dibujo de Georg Dionysius Ehret de la taxonomía ilustrada de Linnaeus, que fue un lenguaje gráfico para articular plantas. Fuente / source: [commons.m.wikimedia.org/wiki/File:Ehret](https://commons.m.wikimedia.org/wiki/File:Ehret)
CLARISI: LINNAE. I. M. D.
METHODUS plantarum SEXUALIS
in SISTEMATE NATURAE
descripta

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Lugd. bat. 1736

Monandria.

Diandria.

Trandria.

Pentandria.

Hexandria.

Heptandria.

Octandria.

Enneandria.

Decandria.

Dodecandria.

Icosandria.

Polyandria.

Didynamia.

Tetradynamia.

Monadelphia.

Diadelphia.

Polyadelphia.

Syngenesia.

Gynandria.

Monoeccia.

Dioccia.

Polygama.

Cryptogama.
talk about plants in design, and when we do, how do we understand what plants ‘are’? This question informs how we design to not just ‘use’ plants, nor ‘accommodate’ them, but ‘collaborate’ with them in real, material terms. This then becomes a question of plant agency in design and its implications for the practice of architects, landscape architects, and urban designers.

In my recent book Overgrown: Practices Between Landscape Architecture and Gardening (Raxworthy, 2018), I developed a new design language for plants that I modeled on the tectonic in architecture, which I called the *viridic*. In the first section of this paper, I introduce this concept and position growth itself, rather than branches (for example), as its material. Since growth is transformation in time, I argue that a change of practice is required, from representation to real-time action, like the gardener. Nonetheless, the *viridic* still views plants as material, so I attribute this view to the ways plants are taught in landscape architecture and horticulture courses. I contrast this view with recent discussions of plant thinking and the ‘more than human’ to explore ethical and political dimensions of plants and working with them. Ultimately, I propose in the second section that a key criterion for a more ethical use of plants is ‘agency,’ where I look at common ways that architecture accommodates. I argue that plants need to ‘feedback’ on or affect their container – and not just occupy it – to really have agency in human use. Finally, I return to the *viridic* to reflect on this question of agency, concluding that, by focusing on maintenance as a reactive practice in the *viridic* can allow such agency.

**A Plant Language**

The ‘roots’ of my investigation into plants stem from a larger project to develop landscape architectural theory concerning the properties – and implications for practice – of its core materials – topography, water, and plants –, which are characterized by their changeability in relation to natural processes. In particular, the impetus for the development of a theory of plants in landscape design came from Elizabeth K. Meyer (2009), who asked: what landscape architectures equivalent to Clement Greenberg’s “medium specificity” might be regarding plants? In his essay “Modernist Painting,” Greenberg (1960) sought to strip back painting to its literal surface and raw materials (paint), liberating painting from historical content and figuration. Looking closer to home than painting, I found a relevant model in architecture: Gottfried Semper’s (2004) ‘tectonic,’ popularized in the late twentieth century by Kenneth Frampton (1995). The tectonic was only one of several materials considered by Semper in his treatise *Style in the Technical and Tectonic Arts*, in relation to a schema where “[the] work [is] a result of the material used to produce it, as
well as of the tools and procedures applied” (Semper, 2004). According to this schema, a material has inherent properties that allow it to be manipulated by techniques, where that manipulation is tied to a practice and a practitioner. Thus, for the tectonic, for example, the structure of timber exhibits particular advantages and disadvantages, at the same time that it can be manipulated using tools like saws and chisels that engage with its cellular structure. Throughout this definition, the figure of the carpenter – the tektōn – is present undertaking activities between tools and material that catalyze the nature of the material. Treating this criterion as an algorithm, I substituted the plant and gardening techniques and, indeed, the gardener into Semper’s schema to propose the viridic.

In describing time, Henri Bergson (2002) noted that “real time” was at the bow of a boat where the waves cast by its prow were the past, records of transition, but always after the moment itself, essentially ‘lifeless.’ My definition of viridic agrees with this, since it considers that the liveness of plants – their growth – is the material, not the wood or branches, which are records of that process, or what Gregory Bateson (1979) called “prochronism,” like tree rings. In this way, my view of plants is different from key planting designers in landscape architecture, such as the Modernist innovator James Rose. Rose (1958; 1993) developed a highly considered plant taxonomy to describe the branch that attempted to create landscape analogs between architectural form and space, proposing transparency through plant forms that implied space but did not block it, which, nonetheless, focused on branches rather than growth itself.

The call for papers for this edition of ARQ was rightly critical of plants becoming a color applique of green, a symbol for environmentalism. While green can seem like a superficial word, if we look deeper, the word cannot be separated from plants, and notably chlorophyll, the substance that drives photosynthesis. With chlorophyll in their cells, plants undertake the alchemy of splitting oxygen and water from carbon dioxide and producing energy for themselves. This process is the physiology that then produces plant morphology, where branch architectural form is the result of a process driven by ‘green.’ ‘Green’ is thus

“A key idea implication of the viridic is that, once growth itself becomes the focus, the centrality of design as prediction is dislocated and, instead, it is the ‘real time’ practices of gardening that work with plants, forming the basis of the viridic.”
not just a color but an engine, a hue that links the
sun to life on earth and produces growth as its result.
Correspondingly, I used the color green, and its
etymology, to develop the viridic. With the research
into color by Michel Pastoureau (2014) as an example,
I invented the term viridic by building on the Latin
name for green, virent. Digging into the word reveals
that green is more than just a name for a color but
an action in the world, such that its Latin root shows
how plants and green become names for other things:
thus, multiple plants are virentia, like the English
“greenery”; the garden is a viridarium; and, crucially,
growth is viridesco. The fecund and vigorous nature
of growth by plants has been discussed both by Luce
Irigaray (2016) and Patrick Blanc (2005) in terms of
sexuality, being present in the word ‘virile,’ which has
the same Latin root.

A key idea implication of the viridic is that, once
growth itself becomes the focus, the centrality of
design as prediction is dislocated and, instead, it is
the ‘real time’ practices of gardening that work with
plants, forming the basis of the viridic. By examining
the private garden of the Modernist landscape
architect Sven-Ingvar Andersson in Marnas, Sweden
– one of my case studies in Overgrown –, I show
how, despite there being little change in the plan of
the garden since it was planted, it was Andersson’s
maintenance acts that gave it its final remarkable and
diverse spatial qualities, which could not have been
projected at the time the plan was drawn. Instead,
it was Andersson’s reactions after observing growth
what allowed him to optimize emerging plant and
spatial effects that arose over time. A feature of the
garden was a series of topiary chickens that were
produced by shaping hawthorns, but “Andersson
foresaw a time when he would no longer have the
strength to ‘hold clippers or climb up ladders,’” at
which time his “henyard would become a hawthorn
grove” (Whiston, 1998:92) as the plant form would
change as maintenance changed. Here, Andersson was
calibrating his own aging to the shape of the plants,
thereby affirming a temporal continuum of life that he
too occupies, that he shares with plants.

Plant Material
In developing this definition of the viridic, I have
regularly utilized the term “material” to describe plants.
However, Andersson’s calibration of plant growth to
human growth importantly directs us to some degree
of organic equivalence between us. Correspondingly,
even as I use the term ‘material,’ I also argue that
plants are not material but living beings under constant
physiological processes resulting in morphological
change, just as we humans are, making plants more
similar to us than bricks, for example. Nonetheless,
while one might expect those concerned with plants
– horticulturalists, landscape architects – to have a
deeper appreciation for plants as beings, this is not
necessarily so.
In most horticultural and landscape architectural courses, there’s a subject that involves ‘plant materials,’ generally including ‘culture,’ that is, the growing of plants via ‘horti-culture,’ and their ‘use,’ or how particular plants can be used in gardens and design. These subjects use common growth ‘habits’ that determine the category to which a plant is allocated – shrub, tree, or groundcover. These habits then inform suggestions of their potential use, so that, for example, shrubs are recommended for ‘screening,’ because their height allows them to visually obscure boundaries, while low perennials are for ‘borders’ on path edges, to be looked across. In developing a planting design, landscape architects then choose different species from these use-typologies to give their planting some ‘diversity,’ although, in a kind of ‘species profiling,’ the individuality of plants is subsumed to their formal role in a design. The only typology of plant form where it...
might transcend its use in a general growth category is the 'specimen,' where a plant's oddness allows it to be exhibited like a sculpture or like an animal in a zoo.

In his essay, "The Meaninglessness of Gardens," philosopher John Ferrari (2010:34) makes the important qualification that "the elements of a gardener's art are lives – not living things, but lives." By making a distinction between a plant as a 'thing' – which suggests an object, a generic thing – and a 'life,' Ferrari is pointing to our shared organism-hood, seemingly refuting a move to objectify the lives of plants. As a life, acknowledging them as alive as us also means acknowledging their difference. Another philosopher, Michael Marder, has developed what he calls "plant thinking," which is "the non-cognitive, non-ideational, and non-imagistic mode of thinking proper to plants," which he characterizes as "thinking without the head" (Marder, 2013:10). Without a head, plant thinking is very different, and as such, even as a gardener encounters a plant, for Marder (2013:4), "the absolute familiarity of plants coincides with their sheer strangeness [...] [such that] whenever human beings encounter plants, two or more worlds (and temporalities) intersect." Plant thinking is a particular relationship to the environment and other plants, in which some are welcomed and also driven away using hormones and secretions. This attention to the plant as a living being fits into the recent discourse of the 'more-than-human' – a term coined by Sarah Whatmore (2006) – though Ferrari and Marder predate much of it, and their qualifications are useful because this term risks in itself becoming a proxy for a deeper and more nuanced discussion of the implications of the term, such as the political, that Ferrari draws attention to, disconcertingly.

For Ferrari (2010:37), while a gardener "wants his plants happy," the gardener is also a dictator, because "the 'happiness' – the health – of the individual plants must remain only a subordinate concern" since the overall beauty of the garden (to use Ferrari's terms), or the particular design intent of the landscape designer, must be the primary focus. Ferrari here is pointing us to a key contradiction between our interest in plants as "more-than-human" beings and our desire to use them in design, which is implicit in design ideas about plants, and indeed, in the *viridic*. Richard Weller (2006) has called landscape architecture an "art of instrumentality," and while this view was noted in relation to the early twenty-first-century discourse of landscape urbanism, this sense of instrumentality has only increased in recent times in connection with climate change. Whereas elements like green-walls and green-roofs may have once been novel, they are now a vital part of the formal vocabulary of the "biophilic": "the use of the natural world to inform and directly contribute to design, engineering, landscapes, communities, and construction" (Gorse; Johnston & Pritchard, 2020). In terms of climate change mitigation, plants have been proposed *en masse* to act as carbon sinks for the world, demonstrating that
even as the idea of ‘more-than-human’ relations has gained traction (Bastin et al., 2019), it is accompanied also by an increase in the objectification implied by instrumental use.

Considering that plants must play a vital role in the future city and that this means that some degree of instrumentality will be required in approaching them, how might we reconcile this requirement with a desire to respect a plant’s ‘more-than-human’ status? Here we can look to a concept that was developed during post-modernism but has had a recent renewal of interest: the ‘cyborg.’ Theorized by Donna Haraway (2016:5) as “a cybernetic organism, a hybrid of machine and organism,” and further as “a creature of social reality as well as a creature of fiction,” and though its original theorization was feminist in nature, the concept, as an amalgam of nature and technology, has been pervasive. For landscape architecture, Elizabeth K. Meyer (1994:29) extended this definition to develop what she called the “landscape cyborg,” a “both/and relationship... [a] hybrid, human nature and non-human nature [which is] an ontological construct [that] establishes a continuum within the world of living organisms – plant and animal – and natural systems.” While the examples that Meyer uses – such as Central Park designers Calvert and Vaux’s Back Bay Fens, in Boston – are no less instrumental than contemporary uses in the biophilic, both Haraway and Meyer recognize the inherent political context and contradictions in the idea of a synthesis between ‘nature’ as being and as technology. A central contradiction is a seeming respect for plants as ‘more than human’ with an instrumental use of them, without allowing plants any real agency in design.

**Plant Agency**

Despite being fixed in one location, plants have an inherent agency in that as much as they are influenced by their environment, they also substantially influence it to suit themselves, as Marder noted. They do this by secreting allelopathic chemicals that inhibit the growth of other plants, but also in a more general sense by providing microclimate to other species through shading and protection, and by changing soil characteristics through the introduction of organic matter, for example. In this sense, plants are social organisms, despite human desires to understand them separately through the compartmentalization of science, seen in horticulture, for example, in the arboretum, which tries to understand the ‘perfect’ shape of plants by separating them from the influence of others, ignoring the fact that trees live in forests communally.

In *Novelty in the Entropic Garden*, I attempted to define a spectrum of ways that change could happen in the designed landscape, drawn from the way that landscape materials change, in living ‘materials’ like plants but also inorganic materials like rock and soil. One of my case studies in my doctoral research was the
Ecocathedral. Commencing in the 1980s, Dutch artist Louis Le Roy created what he called the Ecocathedral in Friesland in the Netherlands (Boukema & McIntyre, 2002) where he piled up recycled masonry on his empty lot to create ‘tables’: platforms that became an artificial topography. While he did not plant anything on the site, his construction technique of stacking the masonry without using cement mortar created what he called ‘gaps for nature.’ Although this sounds like an analogy, the fact is he meant the expression literally, since these gaps allowed for his tables to interact more freely with meteorological systems (like wind and rain) and to allow organisms to invade his constructions. During this process, the structures would be moved around by roots, leaning limbs, and so on. This is an example of how a plant might have agency in a design, a relationship I would characterize as the ‘give and take’ of the cyborg, where the amalgam of nature and technology requires both to adjust to each other and where there is allowed space for this to happen. This ‘space for nature’ is at the intersection between the organic and the inorganic, where a space for the former must be left in the latter.

What might this ‘cyborg space’ look like? Analyzing Le Roy’s Ecocathedral, we can sketch out some characteristics: first, the material must satisfy the requirements to be a medium for growth, that is, things must be able to grow in it; second, there must be flexibility in the materials assembly to allow for it to ‘flex’ as the organism grows and changes; and, third, reciprocally, the organism must also somehow positively affect the inorganic assembly, perhaps strengthening or otherwise augmenting it in some way. With this specification, a few examples might be useful to demonstrate, first, what doesn’t meet this specification and then, what does.

As mentioned earlier, green walls – of the type pioneered by Patrick Blanc (2008) – and green roofs (Dunnett & Kingsbury, 2004) form key parts of the biophilic toolbox for the contemporary city, as do ‘rain gardens,’ in-gutter wetlands that form parts of sws or wss systems. All these systems meet the first criteria in so far as they provide for the material needs of the plants, using varying degrees of technological augmentation, the most intensive – and thereby fragile – of which is the green wall. However, while they house plants and accommodate their growing needs, they have very limited agency, and do not ‘feedback on the container’ as I have described it, so the last two criteria are absent. As an ecological system, with their limitations of a base layer of restrictive material, their scope is limited. Deployed ad nauseam on the fake grounds of underground carpark roofs, plants are deployed to achieve aims like temperature control, screening, amenity, and, to a more reduced degree, habitat, but their own agency is severely restricted.

Considering that creating a “well-conditioned environment” is a key task for architecture – that
is, keeping weather out – it’s unsurprising that buildings do not have the ‘gaps’ that Le Roy describes. Nonetheless, prior to the popularization of green walls in the early twenty first century, Czech-Australian landscape architect Vladimir Sitta proposed a fundamentally different type of green wall that satisfies my second criteria of a building flexing as the organism grows and changes. In an article called “A Living Epidermis for the City,” Sitta (1983:278) proposed “concepts [...] of self-generating buildings, biological renewal, or biologically ‘alive’ building structures,” which predate the recent work in growing building materials using protocells (Spiller & Armstrong, 2011). He anticipated this upon the essay’s ending, when he suggested that “it is quite conceivable that twenty-first-century man will live under and within the alive pulsating skin of his dwellings” (Sitta, 1983:286). While most of the technologies he discussed in the article do not “transcend the container” his example of how fig trees in Sydney grow in cracks in sandstone, and then further crack it to release nutrients and gain root-space, as well as his general framing, suggest that the material of architecture itself might also change and crack and flex.

Thinking of fig trees again – with their elaborate aerial roots and ‘buttresses’ – my third criteria, where the plant offers something back to the technology that is its cyborgian companion, becomes pertinent. In her recent book Lo-tek: Design by Radical Indigenism, Julian Watson (2019) describes the “living root bridges” or jingkieng dieng jri of the Khasa people in India. Here, the roots of the fig trees are woven and trained to both provide the hanging support structure for the bridges and the foundation for the rock ‘paving’ for the bridge’s deck. While the plant aerial root structures are brought to bear for human use, the agency of the plant is still present, because the role of aerial roots for the plant is increasing biomass and resilience, so this expansion of extent ‘value-adds’ to the plant’s existing agency.

**Conclusion**

As I have argued, we are in a time where plants seem more important than ever, yet within that importance are also contradictions. On the one hand, we need to use plants to mitigate the environmental crisis, which necessitates a very instrumental view that is not
My earlier research was on topography (Raxworthy, 2002), then water (Raxworthy, 2003; 2007), culminating in an overarching approach to landscape architecture in terms of change, before Overgrown.

The term SuDS refers to “Sustainable Urban Drainage Systems” and is used in South Africa, while WSSUD is used in Australia to refer to “Water Sensitive Urban Design.” An early innovator for these systems was Brooke Ryan, in her thesis I supervised at RMIT, for which she received a Churchill Fellowship: <https://www.churchilltrust.com.au/project/to-study-water-sensitive-urban-design-and-sustainable-environmental-systems-in-landscape-architectural-design/>.

Confronting climate change and the Anthropocene has necessitated a repositioning of people subjectively and politically inside the world, as Bruno Latour (2017) has recently argued in his re-reading of James Lovelock and Lyn Marguilis’ concept of Gaia. Yet addressing climate change will also require an instrumental response of precisely the same type that created the Anthropocene. This can – and I would argue it should – lead to a more pragmatic and less ideological view of plants and nature, that ought nonetheless to be ethical. In developing the viridic as a practical dialogue between plants and people via the timeless practice of gardening, the reciprocal self-interest between them creates an active-reaction dance. Human time is paired with plant time, and they share a space.

The ‘agency’ of plants is present in the viridic by the gardener repeatedly observing emerging tendencies in time and reactively undertaking synergistic acts that accelerate, adjust or redirect these tendencies. But, at the same time, that process necessitates a certain materialism, and for that, we need a language, which is something I develop with the viridic. In the inherently compromised situation of the biosphere, humans will have to continue in some way to use nature, even as they recognize that they are part of it. Seeing that the tool has some agency will be the only way such acts will be able to be sustainably played.

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**Notas / Notes**

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