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Entangled Thresholds: Building Multispecies Envelopes Beyond Human Comfort in the Philippines and Japan

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Abstract: Answers to some of the greatest ecological problems can be addressed by recognizing human's part in nature. In the architectural spaces we create, it is through recognition of our interdependencies with the natural world that designers can begin to tackle issues, such as alienation from nature, extractivism, unrestrained growth, and consumption. We reject these harmful approaches and look to collaborative models for designing and living. We need to incorporate »becoming by living together,« as urged by biologist Lynn Margulis (Aanen/Eggleton 2017: 99). »Life did not take over the world by combat, but by networking« (Margulis/Sagan 1997: 29). How do we, as designers and other specialists, collaborate for a more symbiotic future?
In this essay, we study the building envelope – the threshold between inside and outside – to reveal human and nonhuman collaborations in the built environment, along with opportunities for repair. By allowing nature to spill through our walls, new multispecies and community alliances emerge. What are the environmental potentials while expanding the human comfort zone? In dismantling the envelope, what relationships arrive, and how does the role of the architect change?

Keywords: Multispecies Entanglements; Porosity; Abject Spaces; Incremental Building; Dissolving Envelopes; Multisensorial Aesthetics; Adaptive Reuse; Symbiogenesis.

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»Never to tire of [...] opening holes for the world to fall, slip, or seep into oneself.« (Coccia 2017: 99)

Introduction

Humans are part of and inseparable from nature. Due to the destructive impacts of our exploitatively built environment, spatial practitioners must acknowledge interdependency and the benefits of multispecies entanglement. As designers, we reject alienation from »nature« and our communities. We oppose extractivism, unrestrained growth and consumption. Biologist Lynn Margulis urged »becoming by living together«[1] (Aanen/Eggleton 2017: 99). But how do we evolve spatial practices for a more symbiotic future for humans and nonhumans alike?

In architectural discourse on multispecies entanglement, there is a push to connect interior to exterior space (cf. Ingraham 2006; Frichot 2018; Amir 2021) but limited analysis of its potentials (cf. Mertins 1996; Hwang 2013; Frichot 2019). Through case studies, our paper shows that porosity cultivates environmental attunement and human–nonhuman kinship. The »messiness« of wildlife entering buildings mandates a psychological shift to broaden our sense of community and care for the natural world, fostering more resilient communities. Despite the architectural impulse to separate from nature, the intelligence, and ways of working and living together in animals,[2] plants, fungi, and even bacteria, suggest models for mutual survival (cf. de Waal 2016; Haraway 2016; Tsing 2015; Margulis/Sagan 1997). Architects must learn from nonhuman symbiotic relationships to build collaborative communities – for abundance, wellness, and safety in ecological uncertainty.

This paper's case studies embrace interdependency. The architects design with reverence for nature and a reliance on community, as reflected in the openness of their envelopes. As spatial practitioners, their homes instruct us, disrupting typical learning hierarchies. They viscerally engage with the building

1 In reference to »symbiogenesis,« a concept explored by Lynn Margulis, which comes from the Greek roots *sym* (together), *bio* (life), and *genesis* (origin or creation), and can be understood as »becoming by living together.« It describes the evolutionary process by which new organisms emerge through long-term symbiotic relationships.

2 Cf. primatologist Frans de Waal, *Are We Smart Enough to Know How Smart Animals Are?* (2016), which challenges human-centered definitions of intelligence and highlights the cognitive capacities of nonhuman animals.

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process by inhabiting the home and welcoming nonhumans and humans from conception to completion, enriching both the design and daily life.

Architectural knowledge today needs empathic design – looking at the world with soft eyes: We abandon the illusion of dominion over nature, recognizing our mutual roles for survival. Philosopher Emanuele Coccia states: »Cities are from the beginning projects of coexistence with other species« (Coccia 2025a). But how do we balance the traditional desire for comfort and safety in airtight homes, while allowing other species into the design process? We examine this in two case studies, an analysis of their building envelopes, and a speculative section reimagining the standard architectural paradigm.

Theoretical Framework for Expanding the Building Envelope

During the Covid-19 pandemic, people experienced »species loneliness«[3] – the worsened emotional state of those »not encircled by plants and animals« (Gruber 2021). Many felt adrift without human support networks. The imposed separation led many to challenge the nature–culture divide with plants and pets combatting lockdown's loneliness (Ruppert 2022; Ratschen 2020; Cordero Jr. 2021). We suggest the human urge for connection should inform spatial practice: dissolving thresholds between humans–nature, inside–outside, and individual–community.

Tracing the origins of the nature–culture divide, Catherine Ingraham, in *Architecture, Animal, Human: The Asymmetrical Condition*, marks »post-animal life« – the severing of humans from animals – as starting during the Renaissance. Humans separated from nature as they sought to tame it. Animals were removed from both the home and the interior life of the human, the former a metaphor for the latter (Ingraham 2006: 85).

In his 1753 *Primitive Hut* treatise, architectural philosopher Marc-Antoine Laugier wrote about the human relationship to nature and the walls separating them. He argued that architecture was a naturally occurring mediator between man and nature (Laugier 1753) (fig. 1). For centuries, architects worked to keep the outside world *out*. The building envelope shelters, but also reveals our paranoia of the »other,« of dangers perceived – objects of abjection. Psychoanalyst Julia Kristeva describes »abjection« as elements like

3 In *Like Hearts of Birds: Ottoman Avian Microarchitecture in the Eighteenth Century*, Christiane Gruber discusses the concept of »species loneliness,« as popularized by novelist Richard Powers.

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1.
Engraving by Charles Eisen for Marc-Antoine Laugier's Primitive Hut, 1755.

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decay, dirt, and waste, deemed disturbing because they are outside societal norms (Kristeva 1982). Architecture became a sterilization tool, to exclude the world's messiness, including insects, plant and animal life.

The architect's desire to master nature with impenetrable walls disconnects from surroundings and people, a devolution of communities. Architect Andrea Kahn quotes philosopher Luce Irigaray: »Everywhere you shut me in. Always you assign a place for me… You set limits even to events that could happen with others… You mark out boundaries, draw lines, surround, enclose…« (Kahn 1996: 176). The architecture of division reflects anxiety about loss of control – one that forecloses the possibility of mutual flourishing of humans and others. Architect Sarah Wigglesworth urges us to »debate what is meant by ›tidy‹, ›humane‹, ›safe‹, ›clean‹: concepts that architects […] accept unquestioningly« (Wigglesworth 1996: 278). These values uphold a fantasy of »mastery,« suppressing complexity, diversity, and opportunity for messy collaboration across species, scales, and disciplines – the latter promoted by multispecies feminist theorist Donna Haraway (Haraway 2016).

To accept the messiness of collaboration, we look to architecture theorist Hélène Frichot's *Dirty Theory*. Using anthropologist Mary Douglas' definition of dirt as just »matter out of place« (Frichot 2019: 9), Frichot calls on architects to evolve »an ethics of care and maintenance« for our precarious world by accepting the »dirt« that nature and other species bring in (Frichot 2019: back cover). Some designers now rally with nature: Joyce Hwang's Bat Tower offers roosting space for bats[4]; CookFOX's terracotta facade shelters bees, birds, and plants[5]; and Emilio Ambasz's Prefectural International Hall features green terraces hosting birds, insects, and people[6]. The challenge, as Hwang writes in Living Among Pests, is to also fundamentally »rethink the spatial and visible dimensions of animals and urban organisms […] to envision the possibilities of living among ›pests‹« – shifting architecture to embrace new priorities and entangled ways of living-together (Hwang 2013).

Fortified by the theories and projects above, we, the authors, »stay with the trouble,« as Haraway urges, or rather, *let's run with it* (Haraway

4 Hwang, Joyce/Ants of the Prairie (2010): »Bat Tower,« https://www.antsoftheprairie.com/?page_id=203, accessed May 15, 2025.

5 COOKFOX Architects (2022): »COOKFOX and Buro Happold Design Bird and Bee Friendly Façade for Architectural Ceramics Assemblies Workshop,« https://cookfox.com/news/cookfox-and-buro-happold-acaw/, accessed May 15, 2025.

6 Emilio Ambasz & Associates (1990): »Fukuoka Prefectural International Hall,« https://www.ambasz.com/fukuoka-prefectural-international, accessed May 15, 2025.

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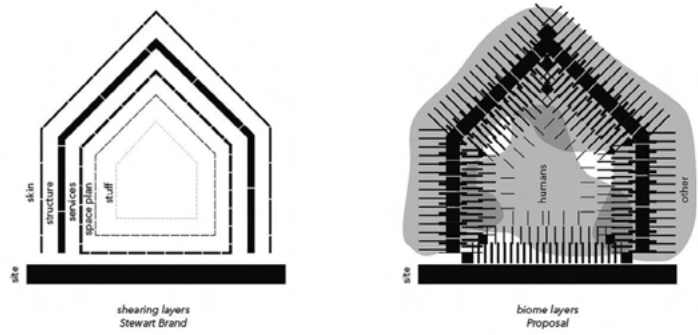
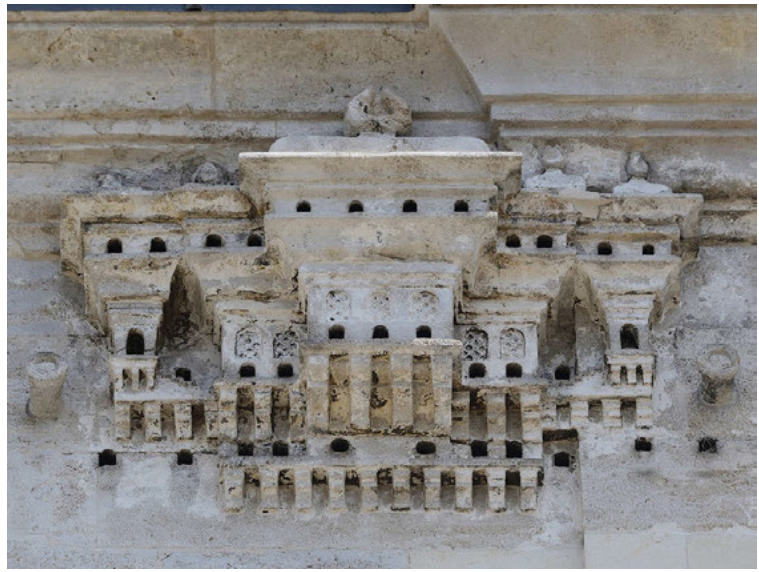


2.
Recreation of Stewart Brand's »shearing layers« diagram (left), and the authors' proposed diagram for »biome layers« of permeable walls (right). Drawings by FLUFFFF studio, 2024.



3.
Bird palace at the Ayazma mosque complex, Üsküdar, Istanbul, constructed 1758–1761. Photograph by Dosseman, 2023.

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2016). Not fearing nature, we embrace it to thrive amid planetary crises. Haraway's Chthulucene (in revolt against the Anthropocene/Capitalocene/Plantationocene) offers worlds of interspecies collaborations for hopeful futures. The building envelope can be a zone for alliances and a renewed sense of community.

Rejecting modernist isolationism, environmentalist Stewart Brand, in *How Buildings Learn* (1994), reevaluates buildings as living organisms that change, influenced by materials, inhabitants and climate. Based on architect Frank Duffy's »shearing layers,« Brand identifies distinct, interacting strata, evolving on different timescales: Site, Structure, Skin, Services, Space Plan & Stuff (fig. 2). Traditional building, he notes, allows for adaptability to shifting needs, unlike modernist designs professing purity of form. This adaptability is facilitated by »slippage« of layers: Layers with longer timescales (Structure) do not hinder those with shorter timescales (Services). Thus, spatial practitioners can work with the slippage – welcoming time, life, and decay into our walls.

Throughout history, we've seen slippage *and spillage* in built form, approximating the multispecies walls of the Chthulucene. In 18th century Ottoman avian microarchitecture, we find stone walls made not for agricultural or extractive purposes but as safe haven for birds, based on human-nature custodianship and harmony (fig. 3). Building envelopes amplified their physical and sonic presence – the rush of wings and echoing of song – within the bustling city, contrasting with Euro-American values of utility and control (Gruber 2021). Bird dwellings also brought bird excrement – the discomfort of living together – versus the modern cleanliness fetish exemplified by bird-deterrent spikes. The Ottoman walls articulated »an ethics of engagement with nonhuman others [...] embracing a multisensorial aesthetics of delight« (Gruber 2021), proving there is »no sanctuary from the inclusiveness of nature«, as environmental aesthetics philosopher Arnold Berleant states (Berleant 1992: 8).

Designing with intentional openings, we become attuned to the environment, shifting how we think about buildings, cities, and ourselves. Challenging monolithic walls, we should design with porosity: permeable thresholds that »[breathe] with openness, connection, and light« (Holl n.d.). Urbanist Sophie Wolfrum traces the term »porosity« to Walter Benjamin and Asja Lacis's reflections on Naples, where the boundaries between spaces are fluid, creating a stage for improvisation. Wolfrum notes the term's evolution

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into an urban and architectural paradigm that describes the »layering and mélange of spaces,« structures, and urban textures (Wolfrum 2018: 9).

Porosity can be understood as not only physical – allowing in air, moisture, and light, flora, and fauna – but an expanded ethics for social and ecological intertwining. By giving our walls flexibility and life, new alliances emerge. Pleasurable spaces (cf. Lacaton/Vassal 2024) nurture a sense of place for humans and nonhumans. Porous skins reveal surprising symbioses, guiding spatial practitioners in repair and new ways of building and living together, as in the case studies below.

Here we focus on two paradigm-shifting homes – in the Philippines and Japan – that radically rethink the building envelope, challenging conventional boundaries between inside and outside, human and nonhuman. They embrace porosity and allow nature to co-shape space. Our methodology included a remote interview with Filipino architect Justin Guiab, and an email exchange with his wife, Sarah Strugar, who offered a vivid glimpse into the home's multispecies life. For the Japanese case study, we draw from a firsthand site visit in 2019 and publications and lectures by Mio Tsuneyama and Fuminoru Nousaku.

These architects seek to disintegrate walls and extend thresholds, creating space for the environment and nonhumans to enter. When nature came knocking, the designers grabbed a sledgehammer and made openings.

Case Studies

Happy Valley House by Justin Guiab, El Nido, Palawan, the Philippines, 2021–present

> »We live here, but the insects, animals lived here before me. And as they build their homes in our home, I feel happy to share it with them. This is really their space and we're just trying to coexist with them.« (Guiab 2024)

In our engaging interview with architect Justin Guiab, we discovered that the porosity of his home was less a formal plan than a lifestyle extension involving both community and environment. When Guiab and his wife, Sarah Strugar, acquired land in the El Nido, Palawan Forest, they cleared only a small portion, thereby preserving trees. For a year, they lived in a hut, observing their environment (fig. 4). Guiab noted, »I tried to get to know

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the trees, the birds, the animals, and insects that lived here« (Guiab 2024). He studied the sun, wind, and topography. »I kept asking the house what it wanted to be. Later, it told me where to build, and what it could become« (Guiab 2024). The result is a project that dissolves the envelope, allowing nature – trees, animals and insects – inside.

Constructed with almost no walls, using »humble materials« like clay, wood, rammed earth, and concrete, and with no clear entrance, the house can be approached from any angle. With only the bedroom, study, and pantry enclosed, the envelope is just a floor slab and roof that gesture to its thresholds (fig. 5). The steep incline of the roof preserves the traditional method of cogon grass secured to purlins with rattan. Gaps in the roof allow natural light and ventilation, while artificial lighting mimics natural lighting. The open-air bathroom houses a bathtub hand-carved from river rock, where the family bathes using spring water (fig. 6). Greywater flows to an adjacent pocket garden with swamp taro plants filtering and absorbing runoff.

Guiab utilized locally sourced materials like *ipil* wood to support animal and insect life within their home. The use of on-site materials with a minimal envelope allowed for a scaled layering of homes and the species associated with them. The cellular logic of a mud wasp nest is built upon the timber frame logic of the house (fig. 7). Brand's theory of shearing layers is expanded to include a layer for ecological integration, that of multispecies slippage and *spillage*. A collage of aesthetics results, generating community in a barely present envelope:

> »From the wasps who build their little clay homes on the walls, to the sunbirds that hang their nests from the passionfruit vines in the bathroom to our dogs, our cats, our chickens… everything feels alive. Even the house feels alive. Even the concrete feels alive because of all the life around it.« (Strugar 2025) (fig. 8)

Driven by an empathic heart, Guiab initially refused to use the local *ipil* tree (*Intsia bijuga*, also merbau), which is threatened by illegal timber activity. However, alternate wood sources proved unsuitable for the climate and cross-species cohabitation. *Ipil* thrives in harsh conditions and is termite-resistant, carbon-negative, long-lasting, and beautiful. Only two trees would be needed to build a home to last 100 years. Guiab's deep consideration of material and sourcing reflects his activist approach.

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4.
The hut Justin Guiab and Sarah Strugar lived in for a year before constructing their home. Photograph by Justin Guiab, 2021.

5.
An open envelope allows for other critters to freely wander in and through the home. Still from video by Design Anthology, 2024.

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6.
It took three months to carve a bathtub into this rock (bottom), collected from a nearby river (top). Stills from video by Design Anthology, 2024.

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7.
A human-constructed insect home (7a) and a mud dauber wasp nest (7b). Stills from video by Design Anthology, 2024.

8.
Some nonhuman species sharing the home: a tuko gecko visiting the open-air bathroom (left), sunbirds nesting in passionfruit vines in the bathroom (center), and one of many cats cared for by the family (right). Photographs by Sarah Strugar, 2025.

9.
Exterior changes over time of Holes in the House. Photographs by Studio mnm/ Fuminori Nousaku Architects and Ryogo Utatsu, 2017–2018.

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In a radical reversal, Guiab hired workers who were usually engaged in illegal logging to construct his home and plant trees. In addition, his profits are reinvested into purchasing surrounding land – otherwise destined for resorts – to reforest with indigenous trees, creating a feedback loop of care and restoration. To date, he's planted over 4,000 *ipil* trees. By his calculations, planting 25,000 trees over eight years on 30 hectares of land (just 0.027% of El Nido's land area) could construct homes for El Nido's entire population, help restore the water table, and provide habitat for nonhuman species (Guiab 2025).

Guiab's patient approach to spatial practice challenges industry norms. Fortunately, his family and clients are open to a slow approach, despite others' skepticism. Patience allowed for design-responsive moments, like shifting the envelope to preserve bird flight paths or moving the building site far from a termite mound instead of poisoning the soil. Rather than letting ego dictate, Guiab's designs respond to the site and remain adaptable, during and after construction. Wilderness and wildlife morph the design for unique visual outcomes of a home embedded in the forest (fig. 8), with visibly irregular lengths of harvested lumber – beyond the usual controlled architectural approach.

By reintroducing traditional and ecologically entangled building techniques, Guiab's wildly unorthodox approaches challenged the local construction industry. But the workers' initial skepticism gave way to pride and a transformed understanding, influencing the building of their own homes and on other job sites. *Happy Valley House* remains adaptable after construction, allowing for expansions and multi-generational living, echoing Brand's incremental growth concept.

Holes in the House by Fuminori Nousaku and Mio Tsuneyama, Tokyo, Japan, 2017–present

> »We want people to rediscover their own sense of wilderness and what it means to be human in the city.« (Tsuneyama, in Alihodžić 2024)

Another example of porosity in building envelopes is uniquely set in an urban environment: Architects Mio Tsuneyama and Fuminori Nousaku purchased an »unappealing« house in a former industrial neighborhood in Tokyo. Reflecting the raze-repeat-rebuild mindset prevalent due to earthquakes and post-World War II demand, their building was designed to last only 20

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to 30 years (Berg 2017). After a local plant and workers left in the 1990s, the building stood in limbo, unworthy of a real estate listing (Alihodžić 2024). Committing to the property was itself a radical act by the architects.

Named both *Holes in the House and Urban Wild Ecology*, the house was immediately inhabited and reimagined, starting with the envelope (fig. 9). They cut holes in the facade and roof and opened the interior with a continuous stairway from street to roof (fig. 10), reconnecting the occupant with the exterior, inviting the breeze in, and passively cooling the home. Cutting holes in the floor slabs and foundation also introduced the earthy smell of soil. After a large portion of the front elevation was removed, covered only by a blue tarpaulin, all four seasons seeped into the home – dissolving inside and outside (fig. 11). The home's peculiar perforations embody Coccia's statement of »opening holes for the world to fall, slip, or seep into oneself« (Coccia 2017: 99). Tsuneyama explains:

> »As homes are organically connected to our lives and we are inseparable [from] and intertwined with them, I thought: ›What if we could create a kind of wild connection between our lives, evolving needs for space, and our house? Could we discover a new way of living? […] of being at home? […] of being in architecture? […]‹« (Alihodžić 2024)

The architects' commitment to bring nature – a »wild connection« – into an urban context began with assessing the site's resources: the house's orientation; sun exposure in a corner location; a small side-alley; and large ground floor connecting the house to the neighborhood. The »bones« of the building were also part of »tapping into what is already in abundance.« Natural elements were brought in, e.g., rainwater via a pipe from the roof to a showerhead on the ground floor (fig. 12). The architects incorporated a traditional semi-external dirt floor (doma) entrance corridor, extending the outdoors into the home. Though urban, the house evokes traditional Japanese countryside homes.

The couple's approach reflects the movement to reevaluate construction, extraction and material supply chains. A notable example is *A Global Moratorium on New Construction*, issued in 2021 by architect and scholar Charlotte Malterre-Barthes. This provocative moratorium calls to halt new building, take stock of existing resources (e.g., vacant housing), and challenge predatory real estate practices. It urges us to focus on »repairing and prolonging« instead of ever-building (Malterre-Barthes 2021).

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Malterre-Barthes' call to action and the example of *Holes in the House* provide a guide for the architectural crises we face.

With the birth of Tsuneyama and Nousaku's child, making holes extended to the surroundings (fig. 13). They ripped out the side-alley asphalt to create a garden and play area, restoring nature and microorganisms to the alley, »unpaving paradise«[7] in an area suffering from the heat island effect. They reclaimed the street gutter, enabling water to reach the soil for tree growth. Neighbors contributed plants and earthworms as gifts.

Tsuneyama explained, »Tinkering with ready-made tools and doing small agriculture in the city […], tapping into leftover resources and repurposing what others discard: That is what we understand as ecology and what has been separated from our profession« (Alihodžić 2024). With this approach, they softened thresholds delineating inside–outside, underground–above ground, and wet–dry areas. The building became more resilient and porous – a sponge integrated into local ecology and community. The envelope became a link, not a divider, between humans and the environment.

The architects describe *Urban Wild Ecology* as existing at the intersection of both political and deep ecology. They »seek to bring out the wilderness that every one of us instinctively has,« even if forgotten in the comforts of urban consumerism (Alihodžić 2024). Tsuneyama states:

> »[…] comfort should come from understanding and supporting life in a way that respects other species. This approach […] acknowledges multiple species, fosters connections, and envisions an architecture that is not exclusively human.« (Fletcher 2025)

For them, like for Brand, architecture is in a constant state of becoming, »led by the needs, budgetary possibilities, available resources and lifestyles of its inhabitants.« (Alihodžić 2024)

Intentional or not, opening up their home (with the conspicuous blue tarp and other manipulations) allowed more than »nature« to enter. The home became an architecture laboratory within a greater urban laboratory, where guests are welcomed to learn the lessons of *Holes in House* firsthand.

7 In reference to Joni Mitchell's famous 1970 song »Big Yellow Taxi,« the architects took back the alley/parking lot, reversing her lyrics and concept: »They paved paradise and put up a parking lot.«

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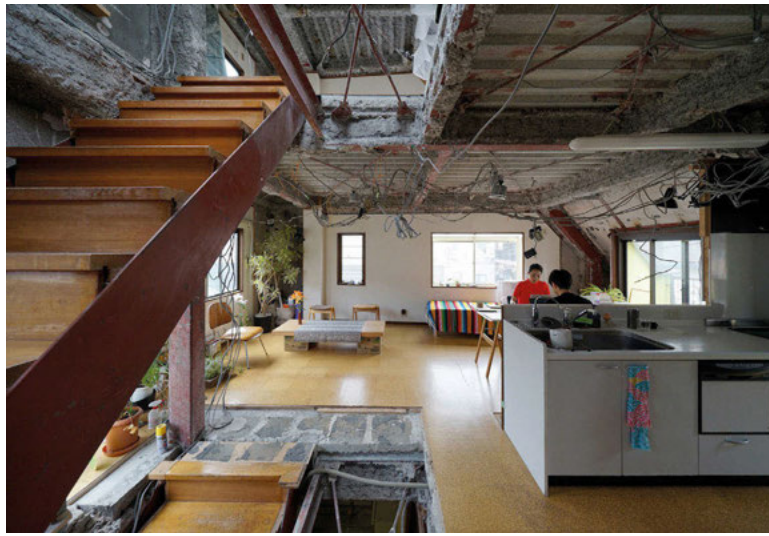

10.
Holes in the House is inhabited in a constant state of de- and re-construction. Photograph by Ryogo Utatsu, 2018.

11.
The architects lived an entire year with large parts of the front facade cut out, covering this opening with only a blue tarpaulin, the air and breeze of all four seasons permeating and flowing through their home. Photograph by Studio mnm/ Fuminori Nousaku Architects, 2017.

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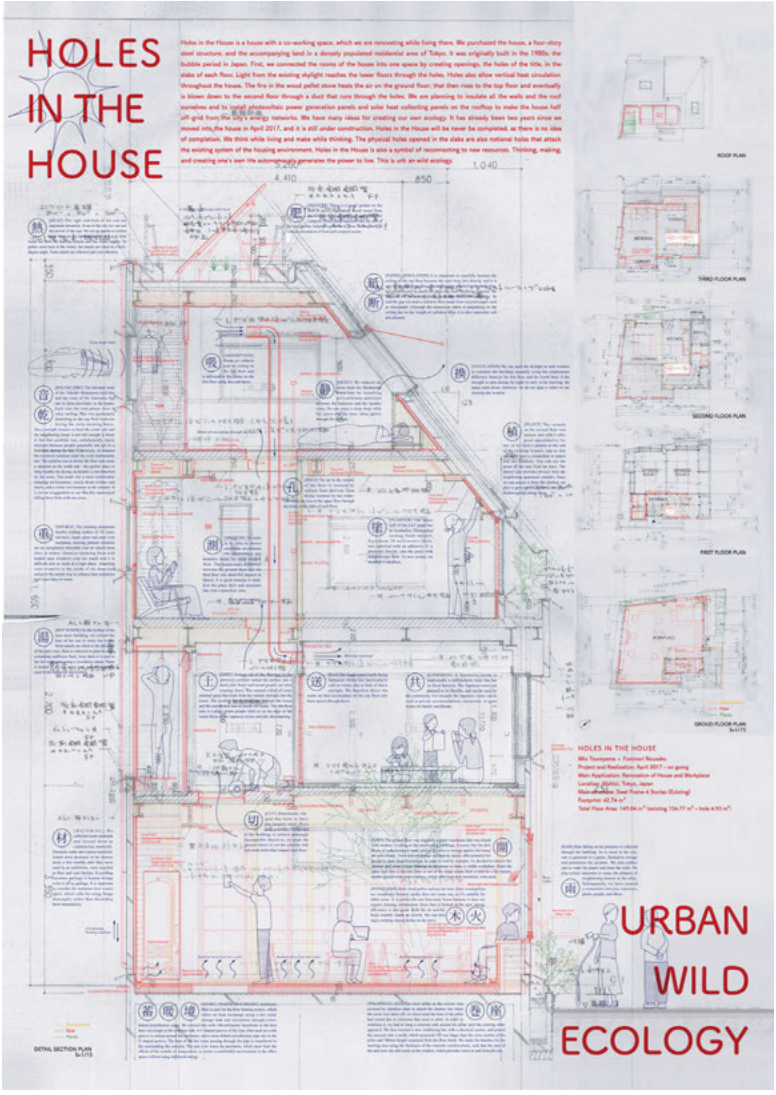

12.
Section drawing by Studio mnm/Fuminori Nousaku Architects, 2021.

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13.
With the help of bamboo charcoal, humus, earthworms, an oak tree, and support from the local community, signs of life – including white mycelium – appeared after two months. The popular food, bitter melon, grows on vines along the main street facade. Photographs by Studio mnm/Fuminori Nousaku Architects, 2019–2020.

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This work reflects an acceptance of process, just as none of the life cycles are rushed in nature. Camping in the home allowed time to attune to the »nature« of the site. Building within an existing structure motivates an ethics of care. Slowing down and accepting natural elements contradicts capitalist standards in homebuilding. Creating *Holes in the House* became an act of care and activism.

Porous Practice and the Expanded Envelope

Both case studies – one urban and one in the wilderness – serve as models for future spatial practices. Many sustainable and biophilic homes invite comparison, but these projects stand out in how they challenge dominant developer-driven practice through porosity and patient building, resisting extractive paradigms. Their approaches are inherently anti-capitalist, against binary divisions of nature–culture, public–private, interior–exterior, and human–nonhuman. They echo feminist architectural critique, folding theory into practice to create thresholds teaming with life (cf. Rendell 2010).

Architectural discourse has favored buildings of large investment, judged by market value over ecological or social aspects. The case studies herein counter this with, as Brand states, value in slow growth and incremental building (Brand 1994: 202). The envelope becomes a temporal as well as spatial threshold – inviting a more situated and thoughtful design process.

Fast construction gained prevalence post-World War II to address the rebuilding, population growth, and rapid urbanization crises (Berg 2017). This persists: Housing crises are met with ever-new construction, ignoring vacant building stock and materials. In our haste, we neglect human, nonhuman, and environmental health. »Fast gets all our attention, slow has all the power« (Brand 2018). The Palawan and Tokyo projects exemplify slow power: Incremental building allows for better integration of nature and nonhumans. Reimagining the architect as a mediator working across multiple timescales allows genuine interspecies negotiation and coincidences to incorporate resources, energy, construction waste materials, and community input.

The case studies emphasize how the architect's role can expand to bring nature, human and nonhuman together as collaborators, with building occupants mingling, bumping elbows with plants, sharing pathways with critters, even breaking bread with bugs. The envelope no longer excludes nature, but is rather an armature of intermingling of natural elements. From

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Coccia's elegant defiance of urban alienation: »The solution to climate change lies not in replacing cities with the countryside, but in designing cities more radically, extending the culture of urban congestion to a culture of congestion of species density, biodiversity« (Coccia 2025b).

Coincidentally, both couples in our cases welcomed their first child in their homes, not altering their fundamental designs. In Palawan, Justin and Sarah completed construction just days before giving birth in their stone bathtub. In Tokyo, the coming child was an impetus to cover exposed insulation, tuck away wires, and install nets over floor openings. Rather than baby-proofing with gates, a porous envelope became a learning tool for the children to develop bodily and spatial awareness and kinship with the world around them.

These homes also became laboratories for ecological innovation in their communities. *Happy Valley House* shifted local builders' mindsets to appreciate a new building process. *Holes in the House* welcomed students and educators to witness construction and ecological interventions firsthand. In both projects, to open the home to »nature« was to open it to nonhuman and human communities.

There is inherent risk in porosity, allowing the community, insects, animals, and weather to enter one's home. However, both families saw value in creating homes as spaces of encounter, not retreat. They dared to carve holes or forgo envelopes altogether, demonstrating how to feel at home in unusual conditions. A unique aesthetic quality arises as we embrace the dust, dirt, and ambiguity of letting the outside in, echoing Wigglesworth's question to modern architects about what is safe and clean (Wigglesworth 1996). The architects transform the abject and uncomfortable into something rich with meaning, yielding environmental, aesthetic, and economic benefits. Old exploitative building mindsets are disassembled by gently subversive architecture.

Kindness, Crisis, and the Comfort Zone

As women in spatial practice, we authors admire these case studies for wrestling with discomfort to allow interspecies entanglement and messiness. In Guiab's project, comforts like central air-conditioning were given up to preserve an open envelope with passive cooling strategies. He demonstrated an ethics of care and kindness: What is not good for one is not good for all. Such altruism invites physical patinas of other life, like the mud homes of

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wasps on Guiab's walls. »To live means to leave traces,« as philosopher Walter Benjamin said (Benjamin 1940).

By engaging discomfort, we wonder how to extend the human comfort zone through adjacency to other species. The modern »comfort crisis« (cf. Easter 2021) must be addressed by architecture: Constant human comfort consumes energy. Beyond energy-intensive mechanical systems, building envelopes are the primary site to mediate thermal comfort. The »comfort zone« and its relationship to architecture is analyzed through psychrometric graphs, charting temperature and humidity. Expanding this graph to the nonhuman, the threshold becomes a zone of human–nonhuman negotiation. Regions of overlap, symbiotic intersections, can help develop building strategies from interior – through building envelope – to exterior (fig. 14). Do they enhance our comfort zone? Can we see beyond our discomfort into the entangled envelope zone and expand physical and psychological comfort for all?

Care and kindness in the design process allow for expansion of the comfort zone. In *Humankind: Solidarity with Nonhuman People*, philosopher Timothy Morton, drawing from geographer Peter Kropotkin, calls for mutual aid that sees nonhumans not as »›companion species‹ or as beings under stewardship,« but as *neighbors* in a shared world, »a concept far more intense« (Morton 2017:173). Similarly, architects Sareh Saeidi and Matthew Anderson's manifesto for *kind architecture* »re-thinks, re-situates, and re-makes architecture [to] prioritise other-than-capital values [...] porous in its spatial attitude.« This architecture »celebrates lifeworld, coexistence, beauty, and time« and »heightens the perception of human-nonhuman entanglements in built environments« (Saedi/Anderson 2021).

Beyond Entanglement to Speculative Photosynthesizing Futures

Given accelerating ecological crises, the role of spatial practice must evolve to support entanglement among species and to imagine and facilitate new forms of living and building together. We look to biological findings on species interdependence in the call for kindness towards our planetary co-dwellers. A more radical concept is explored in *A Symbiotic View of Life: We Have Never Been Individuals* by biologist Scott F. Gilbert et al. Building on Lynn Margulis' symbiogenesis theories, the self-contained body myth is dismantled – we are mosaics of intermingling microbial, viral, and fungal life (Gilbert/Sapp/Tauber 2012). We are 90–99% bacteria, and over 8% of

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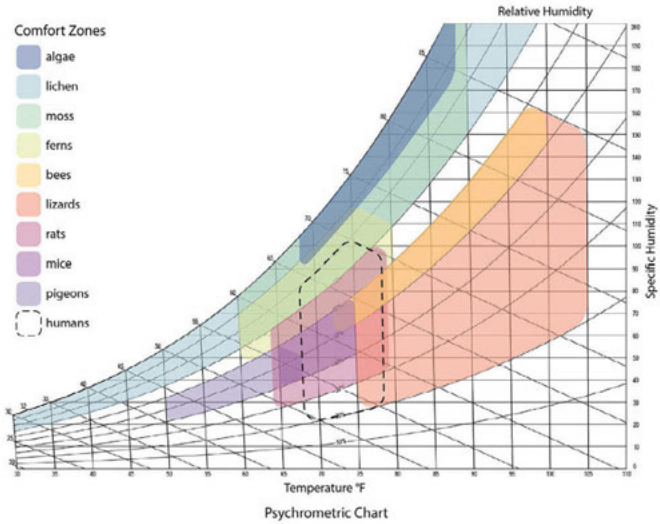
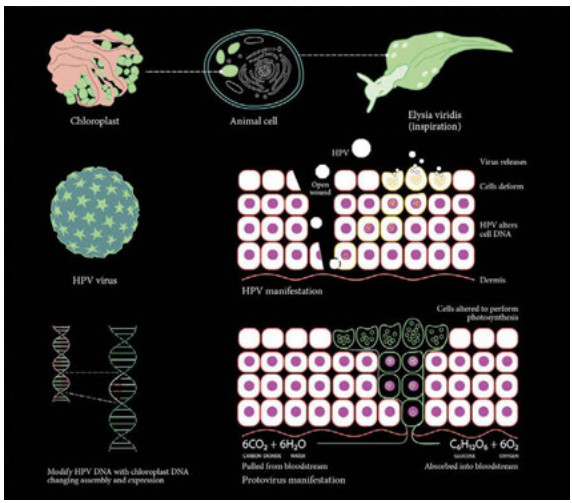


14.
Overlaying the comfort zones of other species (lichen, moss, bees, mice, pigeons, etc.) onto the human comfort zone. Drawing by FLUFFFF studio, 2024.



15.
The speculative co-opting of a virus with chloroplasts to create photosynthesizing tissue. Drawing by FLUFFFF studio, 2023.

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our DNA is viral fragments (Bassler 2013; Zimmer 2012). What may seem monstrous is the fact of interdependence and life.

In our research-design practice, FLUFFFF studio, we explore the blurred boundaries between self–other and inside–outside, to reorient spatial practice. Biological facts can be conceptual provocations for design. Architecture can respond not only with technical solutions for building envelopes, but also through speculative imaginaries that offer models for symbiotic futures. Our short film *Elysia*[8] was born from this impulse (FLUFFFF 2020). Inspired by Jeff VanderMeer's »New Weird« novel *Annihilation*, in which the protagonist resists viewing a nonhuman force as destructive – »It's not killing everything. It's changing everything« (Garland 2018) – *Elysia* envisions transformation as a survival tactic. Drawing from the photosynthesizing sea slug *Elysia viridis*, which retains in its skin functional plastids from the algae it eats (Griffiths 2015), we speculated:

> What if our bodies and our buildings could photosynthesize, absorbing sunlight to clean air like a plant, instead of merely enclosing space?

In our imagined symbiotic future, a virus inserts photosynthetic chloroplast DNA into human skin, allowing us to generate energy from the sun to adapt to new climates (fig. 15). Our building envelopes co-evolve: Facades become chloroplast landscapes of folding, light-responsive surfaces; living walls hum with energy – the envelope goes beyond entanglements to unify with nature (fig. 16). Not a utopian escape, this speculation is a provocation for spatial practices grounded in care and planetary attunement. Community and energy production are woven into the facades here, offering optimistic futures in post-capitalist worlds. The building envelope – once only a protective barrier for human comfort – becomes a site of exchange, transformation, and shared survival (fig. 17). We tackle these ideas to reframe architecture as a caretaker and collaborator in ecological restoration. Through speculative practice, we rehearse alternate futures where the world is no longer built for humans alone.

8 Watch on YouTube at https://www.youtube.com/watch?v=lChC9KXDQoU, accessed October 8, 2025, selected winner of the AA Visiting School's »Visions for Human/Animal Cohabitation« competition, 2021. The short film was screened as part of the *ARCH+* exhibition »Cohabitation: A Manifesto for the Solidarity of Non-Humans and Humans in Urban Space« at silent green, Berlin, June 4–July 4, 2021, https://archplus.net/de/cohabitation-EN/#article-30039, accessed October 8, 2025.

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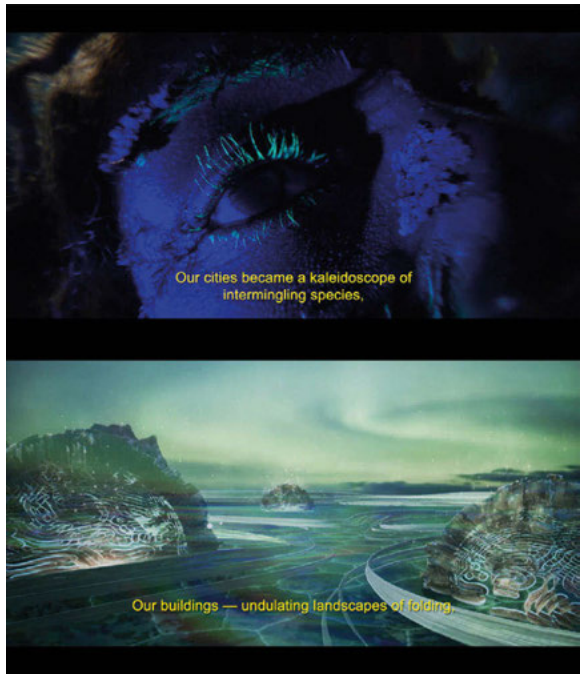
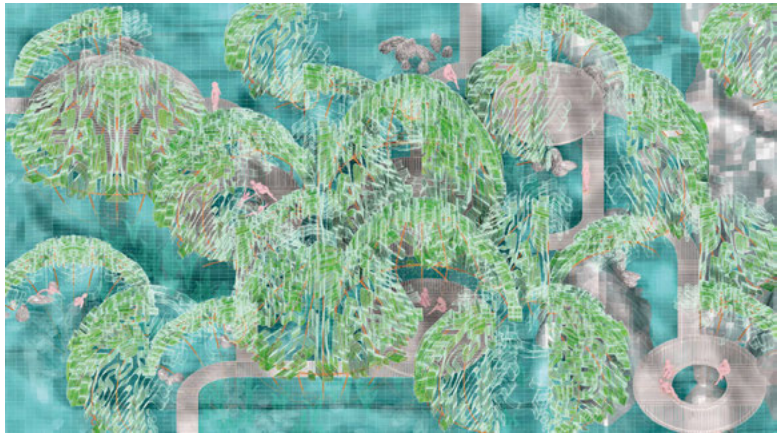


16.
Stills from the short film Elysia, by FLUFFFF studio, 2021.



17.
Speculative visions of interspecies, photosynthesizing envelopes. Drawing by FLUFFFF studio, 2025.

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Conclusion

The projects examined in this paper – both speculative and built – present new roles for the building envelope. The case studies' diverse approaches to the construction process and envelope reflect shifting priorities in spatial practice to incorporate care, biological interdependence, and survival in the face of ecological crises. New perceptions »exhibit more than ways of building; they provide ways of being« (Berleant 2005: 33). An empathic approach centers community involvement and species entanglement in the design process. As Haraway reminds, »individual animals, human and nonhuman, are [...] entangled assemblages of relatings knotted at many scales and times« (Haraway 2008: 88).

By designing with intentional openings, spatial practitioners can attune to the environment and change how we live in our buildings and cities. Envelopes become less a boundary and more a site of exchange, adaptable to flux. Porosity, then, is not a failure of the wall, but an opportunity for ecological and community connection. We propose easing architecture from its habitual anchors – comfort, enclosure, control – toward collaborative practices with an incremental approach embracing change and the unknown. Thus, we can design not just for human needs, but for shared planetary futures. *Let the outside seep in.*

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