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Living Insects in Anthropized Space: Embodiments of the Nature/Culture Dichotomy in Architecture

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Introduction

- 1 Architecture, as an "expression of culture¹" is not exempt from the separation between nature and culture typical of modern Western societies, as described by anthropologist Philippe Descola. In his manifesto book *Par-delà nature et culture*² (*Beyond Nature and Culture*), he challenges the universality attributed to the naturalist perspective, which is based on the nature/culture dichotomy prevalent in the natural and social sciences. He denounces the ethnocentrism of modern societies and the vision of nature as mute and

impersonal, which generates systems of separation between humans and non-humans. He thus advocates for a view that transcends the opposition between nature and culture, focusing on the hybrid relationships between these two concepts constructed by naturalist ontology. This paradigm shift can penetrate architecture, a discipline intrinsically anthropocentric, to design the "outline of a new common house more hospitable to non-modern cosmologies³", and particularly by focusing on the presence of non-humans in anthropized spaces.

- 2 Insects⁴, considered as the animals most distant from humans due to their association with the swarm rather than the individuated⁵ subject, present, according to philosopher Jean-Marc Drouin, "an animality radically different from the one we are familiar with⁶". In much of the collective imagination, particularly in the West⁷, insects evoke reactions of repulsion, especially inside buildings where their presence is uncontrolled. Yet, they inhabit human spaces spontaneously, and their systematic presence indoors reveals a paradox at the very core of architecture, conceived as a shelter for the human body from a "dangerous" nature (Fig. 1). This nature, often seen as repulsive and largely absent from architectural practice, can be found in the reflections of architectural historian David Gissen, who calls it "Subnature⁸", of which insects are a part. Moreover, the integration of living organisms into built environments, increasingly desired and regulated to address ecological emergencies, reaches its limits within this definition of architecture divorced from nature. Ecological architecture often exhausts itself in monopolizing desirable forms of nature (plants, sunlight, wind, etc.), specifically within the rhetoric of the "green", idealized through the aesthetic device of green walls. Yet, many cultivated plants form interdependent⁹ relationships with insects. It is conceivable that the growing appreciation for certain insects¹⁰, in the context of biodiversity protection and the integration of living beings into constructed spaces, may influence architectural practice. However, the potential connections between architecture and insects remain difficult to explicitly establish. The value of insects is often reduced to the fascination they inspire as metaphors or sources of inspiration—particularly in biomimicry¹¹, where they are treated as biological analogies¹² rather than as living species.

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Figure 1. Essence de l'architecture, abri pour le corps humain



Illustration of the author, 2016.

- 4 Increasingly, studies outside the field of architecture are focusing on the presence of living insects within buildings. In 2015, a scientific team conducted a review at the intersection of evolutionary ecology, anthropology, architecture, and human ecology¹³, dedicated to studying the "indoor biome" —a collection of ecosystems inside buildings. Despite its estimated scope, covering between 1.3 and 6 % of the Earth's surface, this biome remains largely unexplored. In 2016, entomologists, for the first time, demonstrated the immense diversity of arthropods present in every room of a building in a survey that was almost architectural in its methodology¹⁴. Architecture, due to its scale, thus provides urban ethology with a new field of exploration, as well as a site for transdisciplinary collaborations between designers and scientists to address these contemporary issues.
- 5 Drawing on references from other disciplines, this article proposes to explore insects as living beings within buildings to examine the concept and ethics of nature in architecture. The question posed is intentionally broad to address this unexplored field: what interactions exist between architecture and living insects? In what spatial forms are the various human/insect cohabitations expressed? Finally, can human/insect cohabitation be anticipated and reconsidered through architecture? This study will focus primarily on references limited to the Western context, as they are the product of the naturalism we aim to deconstruct. Different representations of insects can be identified based on human value judgments. These multiple, often paradoxical figures (pest, useful, neutral, etc.) serve as a prism through which to observe spatial phenomena and question architecture's relationship with this so-called "undesirable" aspect of nature. Three representations of insects have been identified and associated with specific spatial typologies that illustrate them. *Pest* are linked to "sub-architecture"—their habitat within buildings. *Beneficial* insects, which humans seek to protect, give rise to ecological systems that generate or restore territories, which we will call "entomophilic". Finally, the representation of insects as individuated *subjects* provides an opportunity to consider the hypothesis of "bio-empathy¹⁵" within architectural culture and a non-anthropocentric, or "ecocentric" architecture—concepts drawn from environmental ethics.
- 6 **Pest and Subarchitecture.**
- 7 The phenomenon of synanthropy—the relationship that links certain non-domestic animals with humans in whose proximity they live—brings species such as cockroaches, flies, and termites into buildings in an uncontrolled manner. Insects are almost systematically regarded as pests to be exterminated. Architectural historian Ben Campkin, in his reflections on London's urban culture, notes the symbolic power of cockroach effigies that were created during a protest against poor housing conditions in England in 1929¹⁶. In the early 1990s, geographer Nathalie Blanc documented the negative social perception associated with cockroaches found in three public housing towers in Rennes¹⁷. Her study, positioned within the field of ethno-entomology (the study of human/insect relationships), innovatively explores the potential links between human modes of dwelling and insect modes of dwelling.
- 8 An emerging movement in pest control, driven by public environmental health organizations, is calling on architects to design architectural features (ground/building interface, roof, exterior walls¹⁸, etc.) that can prevent or reduce the risk of infestation. Thus, pest control is shifting away from chemical extermination of insects in infested buildings toward a preventive approach through architecture, leading to new collaborations between exterminators, insect specialists, designers, and building professionals¹⁹. The risk of building infestation is likely to increase with climate change, which is correlated with urban growth,

as urban environments provide ideal habitats for so-called "invasive" species. It is therefore crucial to incorporate this risk into architectural design, on the same level as other risks. For instance, the city of Paris was designated a termite surveillance zone by a prefectural decree in 2003. In her dissertation *Living with Termites in Paris*, Pauline Watissée discusses the "termite risk", whose urban threat is compared by cartographer Dominique Andrieu to the flood risk prevention plan, but which remains more difficult to spatially conceptualize²⁰.

- 9 The various fields of expertise regarding insects (pest control, entomology of the indoors, and ethno-entomology) share a common approach in their engagement with architecture through a shared architectural vocabulary. Within this body of work, the same building elements are identified as pathways and habitats for insects, sometimes in the form of plans and sections. The presence of these small animals allows us to view the built environment as an interior biome composed of multiple biotopes. The term "subarchitecture" is used as a neologism to describe those parts of buildings that unintentionally serve as shelters for biodiversity. The prefix "sub-" referencing Gissen's concept of *subnature*, conveys the invisible ("beneath the threshold," "within the wall," "in the false ceiling"), unpredictable (the sub-function of buildings as a shelters for insects), or even neglected (degraded architecture made of interstices and not theorized) nature of the components of subarchitecture, which is an ideal habitat for entomofauna (Fig. 2).

Figure 2. Subarchitecture



Illustration of the author, 2016

Beneficial Insects of the Built environment

- 10 In parallel with efforts to control "pest" species, there has been a shift in the entomophobic attitude in Western culture in recent years, with an increased appreciation for certain "useful" insects (pollinators, soil enrichers, pest controllers, waste removers, weed

controllers, etc.), both as indicators of environmental quality and as actors in the green continuum. In 2016, the Ministry of Ecology launched a national action plan, France, Land of Pollinators (2016-2020)²¹, as part of the Biodiversity Restoration Act adopted in 2015. This plan included innovative measures, such as supporting local authorities in managing urban developments to benefit pollinating insects, including the installation of insect hotels²². The Ministry drew on the work of the Urbanbees program²³ (Greater Lyon) to provide local authorities with a guide for the ecological management of green and peri-urban spaces.

- 11 The integration of "beneficial" insects into human-modified spaces takes many spatial, architectural, and territorial forms. The artificial beehive, increasingly found in urban settings, either on rooftops (Snøhetta's Vulkan Beehive, 2014) or integrated into facades (Philips' Urban Beehive, 2011), clearly represents the first object with architectural qualities that anticipates and controls the presence of insects in anthropized spaces. Beekeeping is perhaps the oldest art of insect breeding and domestication, whose evolution is closely tied to that of the beehive. Rich in typologies (forms, materials, functions), the beehive has existed on every continent and throughout history. Insect hotels, such as Arup Associates' Insect Hotel (2010), are objects that increasingly emerge as landmarks across the landscape, reflecting the desired—and controlled—presence of insects. Lastly, some "green" facades or living walls, a typology that has become dominant in the trend of "ecological" architecture, may be seen as the first evident architectural elements for insect integration. However, this integration remains largely instrumental and anecdotal, often reduced to the status of a "green" marketing tool.
- 12 Other spatial systems, referred to here as "entomophile" to emphasize their valorizing nature, integrate insects into human-altered spaces: from utilitarian urban farm projects (Cricket Shelter by Terreform One, 2016), to projects that accommodate living organisms like the lombriduc²⁴ (Parc de la Citadelle in Lille, 2006), or the living envelope (School in Boulogne-Billancourt by Chartier Dalix, 2014), among others. These systems, designed at the scale of insects or other animals, remain under-theorized in architecture. Ecoducts, which allow animals to cross infrastructures, may have already existed, as noted by Dominique Rouillard, in the representations of "The Mobile City" by Yona Friedman (1958-60), an infrastructure and shared space that accommodates animal mobility²⁵. The design and realization of these "entomophile" systems are not exclusively the work of architects. Nevertheless, they mark the beginning of new architectural typologies in which insects are innovatively integrated into buildings. These systems serve as bridges between architecture and insects, enabling communication between the built environment and other ecosystems, previously difficult to apprehend in architectural design. They establish a new form of human/insect cohabitation, where this cohabitation is both desired and anticipated. Research initiatives, such as the one launched in 2017 by the Chartier Dalix agency, "Architecture et Biodiversité. Penser un nouvel écosystème urbain²⁶", explore the potential of this emerging architectural vocation²⁷: a concrete wall is poured over a composition of earth clods, arranged almost randomly, to create organic galleries within the wall, allowing certain fauna to pass up to the roof, thus promoting the biological activity of the soil vertically. The design of such systems raises the question of balance between control and the uncontrolled: how can we anticipate the integration of part of biodiversity into the built environment while freeing it from domestication?
- 13 Furthermore, these entomophile systems reflect a complexity still not fully grasped in the discourse on revalorizing insects. The boundary between instrumentalization and protection remains blurred, and many initiatives, driven by a socio-environmental vision, remain largely anthropocentric. The decision to define which insects are beneficial implies that some

benefit to humans is expected, often utilitarian in nature, a benefit that is more explicitly identified in breeding systems (cricket or cockroach farms in China, silkworm breeding in France). The expectation of a positive return gives a theatrical aspect to the various objects resulting from this insect valorization, carefully staged for human benefit, though they do possess notable urbanistic qualities. Indeed, urban beehives, such as the Honey Factory by Francesco Faccin in a park in Milan (2015), or the Fabrique à miel by architects Malvina Bali and Camille Garzuel in Lille (2015), constitute true public micro-architectures, between urban furniture and small factories. The effectiveness of such systems remains difficult to quantify and has been questioned in recent years. Indeed, urban beehives can have negative effects on wild pollinators by increasing competition for nectar²⁸. Finally, the initiative to enhance biodiversity must be accompanied by communication efforts to promote its protection, particularly through these spatial systems aimed at raising awareness. However, this valorization suggests that there may be invisible or silent initiatives, in more traditional contexts not referenced here, where uncontrolled insects interact with human spaces in more intelligent and mysterious ways.

14 Insects as individuated subjects of "Ecocentric" architecture.

- 15 A third conception of the insect, avoiding the binary perception of pest/beneficial, reveals more experimental spatial productions where the insect attains the status of a subject—an individual endowed with perception and intrinsic value. The subjectification of the insect implies a certain empathy—understood in a non-affective sense—that is deployed to foster a desired human/insect collaboration. This introduces the notion of "entomo-empathy," incorporated here within the pre-existing concept of bio-empathy²⁹. This concept enables one to "step into the insect's shoes" (understanding, thinking, or perceiving like an insect) to generate space. Examples include rhetorical and biomorphic scenographies that observe the ingenuity of insects, such as in the Micropolis park in Saint-Léons, designed by Collart and Robert Lebarbier (2000), or studies of insect "builder" behavior to generate space, as seen in the Silk Pavilion by MIT Media Lab (2013), where silkworms act as computational tools. They also include sensory-spatial experiences that give access to the perceptual world of the insect, now a "creator" of the work, as in the Wunderbugs pavilion by the OFL agency (2014).
- 16 In his book *Milieu animal et milieu humain*³⁰, the German biologist Jakob von Uexküll highlights the illusion that the relationships a non-human subject has with the elements of its environment take place within our human world. By describing the tick's environment, he demonstrates that the anthropocentric view of a single world, with one space and one time, is inaccurate. Instead, there exists a multitude of subjective environments called "Umwelt," unique to each animal species. In attempting to depict an animal's visual experience—such as that of a fly, through watercolors—Uexküll opens the door to a form of "perceptive" empathy, which can also be observed in the design of theriomorphic³¹ spaces or bioperception. These spaces represent a form of experimental architecture, assigning to humans senses, perceptual organs, and other characteristics specific to animals. Perceptive empathy can also be mediated by technology, as seen in the *Heart City The White-Suit* (1967) project by Coop Himmelb(l)au architects, which provides access to a new subjectivity through the transmission of sounds, images, smells, or sensations previously imperceptible to human senses³².

- 17 The insect-as-subject, in the metaphysical sense of the term, also serves as a philosophical tool for reconsidering the anthropocentrism inherent in architecture and for examining the evolution of its naturalist³³ vision (the nature/culture dichotomy). The hypothesis of a "biocentric" or "ecocentric"³⁴ architecture, terms borrowed from environmental ethics and reinterpreted, allows for the exploration of a new type of human/insect cohabitation³⁵, in which the insect is not instrumentalized to serve a purpose for humans. Yet, the architectural discipline remains intrinsically anthropocentric as an "expression of culture", altering the natural environment in which it operates. Furthermore, biocentrism in architecture does not appear viable from an environmental standpoint. Like anthropocentrism, it remains an individualistic approach³⁶ to living beings. Biodiversity, by contrast, is viable within supra-individual entities such as ecosystems. The ecocentric approach transcends the individual-centered thinking of naturalist classification. Instead, it represents an ecological strategy that considers environments through the relationships between artifacts, and between these artifacts and ecosystems, promoting a holistic vision to ensure the stability and viability of a given system. By applying this ecocentric understanding to architecture and cities, they can then be conceived as ecosystems, both literally and metaphorically: systems of relationships between living and non-living organisms, between products of nature and products of culture, challenging the boundaries between the natural and the artificial.

Conclusion

- 15 The interactions between living insects and architecture described earlier reflect various cultural attitudes of architects towards this aspect of nature, as well as the limitations of their expertise in terms of integrating and respecting living organisms. These interactions also mark the beginning of new architectural perspectives that deconstruct the nature/architecture dichotomy, valuing architecture that incorporates the habitats of other living beings as well as the ecosystemic continuities that enable them.
- 16 The hegemony of "green" and technology offers an incomplete, and sometimes even counterproductive, response in terms of cost-benefit analysis to the ecological emergency. The dominance of plants in ecologically-oriented projects signals the persistence of nature's ornamental character and a lack of understanding of biology, which hinder the ability of the built environment to integrate true ecosystemic viability. Furthermore, many flourishing technological solutions, though explored, face obstacles in their implementation due to a lack of resources, as well as a lack of will and investment stemming from economic, sociopolitical, and cultural barriers. It seems utopian to offer an exclusively technological and scientific response to the environmental crisis. These innovations must be accompanied by other transdisciplinary, and more philosophical, evolutions. A transdisciplinary repositioning, even an ontological "renaissance", is emerging alongside the ecological crisis, described by Bruno Latour as a territory to be reinvented scientifically, politically, and artistically, with the aim of moving away from the aesthetics of what he calls "ecological pornography³⁷". An ecocentric architecture or biocentric design could contribute to constructing a more philosophical and cultural response to the challenges of the crises, potentially invoking a paradigm shift in architecture's purpose. Architects, with their capacity to produce culture and imaginaries, can contribute to this by offering an alternative approach to technocratic utopias³⁸.

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29. Bioempathy is an ethical concept which considers that non-human species have an intrinsic value, an existence value, by and for themselves. Cf. John Baird Callicott. Bio-Empathy. *op. cit.*, pp. 147-153.
30. Jakob von Uexküll, *Milieu animal et milieu humain*, trad. française Charles Martin-Freville, Paris, Payot & Rivages, 2010 [1956].
31. *Theriomorph* refers to an animal form. See video game *Theriomorphous Cyborg*, de l'architecte Simone Ferrera (2011).
32. David Gissen, *op. cit.*
33. This "Naturalism", according to anthropologist Philippe Descola, is based on a dichotomy between nature and culture, to which the natural and social sciences of the modern age have accorded an unfounded universalism in their practice and their ethnocentric view of the world. Cf. Philippe Descola, *Par-delà nature et culture*, Paris, Gallimard, 2005.
34. Biocentrism and ecocentrism are two different environmentalist concepts, born of the reflections of Aldo Leopold.. Cf. Aldo Leopold, *Almanach d'un comté des sables* (1949), trad. Anna Gibson, Paris, Aubier, 1995, p. 283.
35. R & Sie (n) Architects' Mosquito Bottleneck house project integrates the mosquito into the heart of the project, both as an analogy and as a living subject in the architecture, without domesticating it.
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ABSTRACT

The systematic and unanticipated presence of insects in buildings exemplifies a paradox in the very essence of architecture: to shelter the human body against the undesirable nature that these creatures symbolize. Living insects are part of an unthought field of nature in architecture, as they are often considered undesirable, but also because of scale, space, and time issues. The dichotomies that are associated with them: "desirable/undesirable", "controlled/uncontrolled", or "fascination/repulsion", illustrate the impact that naturalism has on contemporary architectural culture and its production, at a time when the integration of the living in the built environment is increasingly desired and standardized. What interactions, whether desired or uncontrolled, exist between architecture and living insects? This article proposes to question the different places that humans grant insects inhabiting the anthropized space, and to measure the impact of different forms of human/insect cohabitation on spatial production in a broad sense: using the architectural scale to examine its integration into urban spaces with territorial interventions. Three representations of insects are presented: "pest", "useful" and "subject", each illustrating specific architecture/nature relationships that are defined using neologisms derived from environmental ethics.

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Keywords : Nature/Architecture Relations, Insect, Ecocentric Architecture, Pest, Bio-Empathy

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