Creating Materials for the Symbiocene – A Proposed Nomenclature

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Introduction

"For the largest part of our species existence, humans have negotiated relationships with our sensuous surroundings, exchanging possibilities with every flapping form, with each textured surface and shivering entity that we happened to focus on ...Today we participate almost exclusively with other humans and our own human-made technologies ... (Yet) we still need that which is other than ourselves and our own creations. We need to know the textures, the rhythms, the tastes of the bodily world and to distinguish between such tastes and those of our own invention."

-David Abram, "The Spell of the Sensuous" (2017)

Ecological Crisis and the Global Movement of Materials

The expansionist globalization mentality of the 1950s through present day, a period known as the "Great Acceleration" (Steffen, Broadgate, *et al.*, 2015) with its false promises of hyper-ecoefficiency through optimized supply chains (Hayden, 2014), has only exacerbated the ecological crisis. It is well-established that human impacts are surpassing the boundaries of ecological functionality of earth systems, putting all species at risk (Steffen, Richardson, *et al.*, 2015).

One cannot ignore the role of design in both creating and solving this crisis. The modern designer is often called upon to serve the political, economic, and industrial goals of extractive systems of production and consumption (Boehnert, 2018) despite widespread recognition of this tension between ecological necessities and human desires (Leach, Raworth and Rockström, 2013). Simply, the pace at which we attempt to meet 'human-centered design' expectations has put unreasonable pressures on our evolutionary origins in the context of other species (Borthwick, Tomitsch and Gaughwin, 2022; Davidová and Zavoleas, 2022). Besides the negative pressures related to our biophysical dependence on living systems, the disconnection from our ecological origins in the majority of our lives is creating a sense of species loneliness, presenting as eco-anxiety (Albrecht, 2020), nature-deficit disorder (Louv, 2008), and rising rates of mental illness in many cultures globally. We can no longer ignore that humans not only need nature in a utilitarian sense, but our physical health, emotional regulation, and social fabric depend on it (Williams, 2017).

The designer has a vital role to play in the creation of the materials and artefacts that will mark the coming phases of economic development in Post-Anthropocene societies (Davidová and Zavoleas, 2022). The transition from human-centred to pluriversal design paradigms is well-underway (Escobar, 2018) with practitioners and scholars calling for life-centred design (Borthwick, Tomitsch and Gaughwin, 2022) more-than-human design (Poikolainen Rosén *et al.*, 2025)nature-centered design (De Pauw, 2015; Ruano, 2019), multispecies design (Gatto and McCardle, 2019; Keune, 2021; Biggs *et al.*, 2024; Lohmann, 2024), and Symbiogenesis-based design (Durán-Vargas, 2019). The sheer number and diversity of those calling for broader epistemological inclusivity directs our attention to a persistent shift away from the human-centered Anthropocene to an emergent and inevitable Symbiocene (Albrecht, 2016; Verniers, 2022).

Code (2006) describes this situation in ecological thinking as: "not simply thinking about ecology or about the environment: it generates revisioned modes of engagement with

knowledge, subjectivity, politics, ethics, science, citizenship, and agency, which pervade and reconfigure theory and practice alike (p.24)". She later continues that ecological thinking is an "epistemological inquiry away from autonomy-obsession toward an analysis explicitly cognizant of the fact that every cognitive act takes place at a point of intersection of innumerable relations, events, circumstances, and histories that make the knower and the known what they are, at that time. Ecological thinking analyzes the implications, for organisms, of living in certain kinds of environments, and the possibilities, for those organisms, of developing strategies to create and sustain environments conducive to a mutual empowerment that is exploitative neither of the habitat nor of other inhabitants (p. 269-70)".

Concurrently, there is a rising conversation about the role that materials play in connecting the designer to the embodied relationships with human artefacts, with a focus on material-driven design guiding the process (Karana *et al.*, 2015; Camere and Karana, 2018; Bak-Andersen, 2021). Most of the materials that currently dominate our lives are disconnected from their places of origin – generally an ocean away from their ecological homes. Plastics, derived from prehistoric photosynthesis, are ubiquitous yet anonymous. Few people know where the source of these materials originated, how they are produced, or what their impacts are. Plastics have left us as global citizens—everywhere and nowhere at the same time—detached from the ecosystems that shaped human evolution. In recent years, pressure has increased for systems of production and consumption to change drastically as circular economy principles become widely integrated across sectors. Transitioning from petroleum-derived to biologically-derived materials is a key aspect of this shift. Ecological thinking as described by Code (2006) is not merely an intellectual exercise but is also an extension of material selves in the material world.

However, simply replacing the current materials with 'more sustainable', 'green', or 'eco' materials will not fundamentally change our relationship with materials, how they are valued, or the extractive systems that create them. For that existential leap of perception, we must examine how our relational values of nature led us into the current ecological crisis and how renewed socio-emotional and eco-cultural forms of intelligence can guide our relationships with materials, artefacts, and systems of production and consumption.

The Influence of Relational Values of Nature on the Design of Human Artefacts

The current ecological crisis begins with the story of the deterministic scientific methods as one of the primary drivers of modern life, creating a situation in which human exceptionalism dominates all ecological circumstances. All other living beings became the 'other', rejected as inanimate and lacking intellect, allowing them to be utilized as resources (Gameau, D., 2023; Capra and Luisi, 2014; Jickling, 2018) Using Kellert's Values of Nature (1995), framework developed in relation to the Biophilia Hypothesis, the dominance of utilitarian, ecologistic-scientific, and dominionistic values of nature have dominated modern relationships with nature. Since the industrial revolution and the social, economic, and cultural homogenization that have accompanied globalized capitalism, the naturalistic, symbolic, humanistic, and moralistic values of nature have declined rapidly, in just a 250 short years of human history.

Modern design education has also furthered our disconnection with place, as the modern designer can quite easily produce an artifact of material or visual value without ever having

interacted with its physicality. The act of making material artefacts through industrial processes rather than craft detached the role of the designer from the maker and the materials (Bak-Andersen, 2021). While the movement of material artefacts of daily life have historically accompanied the movement of human transporters, the artefacts of our time are most often unaccompanied by ownership in a relational sense. Neither their maker, nor their intended user interact with them for much of their life span and at the end of their useful lives, they are discarded to places completely unrecognizable from which they came. Most human artefacts today are globally everywhere, yet socially and ecologically nowhere.

The lively and material origins of our objects are disconnected from their autopoietic and symbiogenic origins (Durán-Vargas, 2019), leaving them decontextualized from their evolutionary homes in forests, valleys, oceans, plains, and rivers. From the perspective of the designer and the end user, systems of extraction are hidden in plain sight and the living, breathing, photosynthesizing raw materials from which the object came to be are even less obvious.

Creating Materials in the Transition to the Symbiocene

Emerging frameworks driving post-anthropocentric material design such as those described as living artefacts (Karana, Barati and Giaccardi, 2020; Kim, 2022; Karana *et al.*, 2023), material ecology (Antonelli and Burckhardt, 2020), and biodesign (Grushkin, 2016; Myers *et al.*, 2018) provide models for how designers can give agency to living beings in the creation of novel materials. These frameworks, however, remain diverse and loosely defined. The ethical boundaries and ecological consequences of biodesign have come to accept a wide array of experimental approaches, at times in tenuous relationship with the very fields that it was intending to confront – the systems of science, innovation, production, and consumption that have driven our current ecological crisis. These frameworks promise an alternative but face similar risks of exploitative mechanisms of production and consumption.

What is clear in this tenuous relationship is that the field of biodesign, the creation of biomaterials, and the designer's relationship with the organisms they employ to create living materials are not exempt from the epistemological constraints of a Western education (nor do I wish to imply that I am exempt from these epistemological constraints myself). To move through these constraints, designers must give careful consideration to the systems of value in which we co-create with other organisms and ecosystems and frequently revert to utilitarian systems of viewing and valuing nature. For example, agar, a derivative of red algae used widely in biodesigned materials, is often praised for its sustainability characteristics, however, without knowledge of its ecological origins. Similarly, materials like gelatin or kombucha are used without transparency regarding their native ecosystems or production impacts. Without careful attention to these contexts, biomaterials may replicate the same extractive and disconnected systems as petroleum-based plastics. While biodesigners have achieved immense success in early experimental phases, significant challenges remain regarding the scaling, manufacturing, and supply chains needed for the widespread adoption of biomaterials.

In this newly defined relational era of the Symbiocene, humans re-enter the ecologically material world as apperceptive participants - participants who are aware of their own participation - in the co-creation of materials with their origins in the biosphere and

lithosphere. The transition to relational values of nature requires ecological thinking (Code, 2006) and embeddedness in an ecological epistemology in which we accept that "knowledge is embodied in interdependent living systems" (Campbell, 2008). In contrast to "epistemologies of mastery" (Code, 2006 p129), the designers of the Symbiocene must be well-equipped with ways to discuss, source, and engage with materials that supplant them firmly in the current ecological situation of the materials' origins. If biodesigners are to accomplish the intended impact of restorative ecological actions, the origins of our materials must be specifically situated in the biophysical, ecological, and geological context of extraction and production. The geopolitical and economic origins must become of lesser priority.

The Scaling Challenge and the Need for Terminology

The origins of products and their materials are notoriously difficult to trace (Rinaldi *et al.*, 2022; Ospital *et al.*, 2023). In some small-scale examples, experimentation with biologically- and ecologically derived material feedstocks at a local and regional level are traceable from producer to end-of-life (e.g., craft- or custom- made products). Product traceability will soon become the norm with new requirements for Digital Product Passports (European Union, 2024), but what remains to be seen is whether increased traceability will lead to a reduction in negative ecological and social impacts from systems of production and consumption. Knowing the geopolitical origins of a product or material does not reveal impacts. Nor does this geopolitical transparency give regulators, manufacturers, or customers specific data on the ecosystem services lost through the products life cycle. A more advanced and nuanced approach to traceability might include a detailed description of the ecological origins of each component of a material or product.

There are many ways to describe and categorize materials - material type (metals, polymers, composites, ceramics, natural materials, etc.), physical properties (hardness, density, transparency, elasticity, porosity, etc.), sensory attributes (texture, color, temperature, etc.), country of origin, environmental conditions of intended use, and many other nomenclatures to relate materials to our various ways of knowing and disciplinary perspectives. Each of these categorizations provides a unique relational value on the materials situated within cultural and disciplinary perspectives. Some are more technical while others are more application based, and often the descriptions fail to communicate easily across disciplines (Johnson, 2013; Wilkes *et al.*, 2016). Materials libraries, gaining population globally in recent decades, have developed various classification systems to organize their inventory and direct their users towards the most relevant samples for their needs. By definition, a classification system is both descriptive and limiting, and as such, the terminology assigned to materials in any classification system will guide how we think, feel, and imagine about various materials. The classification of materials is an opportunity to guide users into new ways of viewing and valuing not just the materials as they are, but also their feedstocks, origins, end-of-life considerations, and many other variables. As with any novel discipline, the terminology describing biomaterial systems requires careful consideration. The current focus on physical and performance properties of biomaterials fails to account for their ecological origins and places of production. However, given the global ecological crisis, there is a pressing need to align biodesign practices with bioregional specificities to address these gaps and to reconnect humans with their local ecological contexts.

Through advanced experimentation with biotextiles and biomaterials, biodesigners are re-purposing biologically derived industrial waste and sourcing feedstock materials from local ecological contexts. In many cases, however, the feedstock materials that are used to create biomaterials and biodesigned artefacts are not traceable themselves. As the global movement of biological materials remains pervasive, it prompts critical questions:

- How do our current descriptive terms in biomaterials and biodesign influence our perceptions of sustainability and our relationships with place?
- What does it mean to have a bioregionally adapted material lifecycle?
- How can biomaterials enable deeper engagement with ecosystems rather than perpetuating globalized production and consumption paradigms?

The primary objective of this material design project is to connect designers and users of materials to their ecoregional origins and develop a sense of symbiotic relational engagement with the organisms or origin. In the broader global context of systems of production and consumption, this research explores a proposed nomenclature for biomaterials that classifies materials not merely by their physical attributes but by their relationship to ecosystems and places of origin.

Methodology

To explore these questions, three main areas of interest were examined through two main methods. The two main areas of interest included Biomaterials and Biodesign Classification Terms and Materials Designed for the Symbiocene. These areas were explored using internet-based research and collaborative experimentation in the creation of biomaterials.

Biomaterials and Biodesign Classification Terms

The first area of focus was a review of the biomaterials and biodesign literature and commercial realm regarding descriptive terms of materials used as categorization. Given the recent emergence of biodesign in the academic literature, previous studies in this area have mostly been in the scientific literature related to the material sciences and the existing classification systems are relevant for technical audiences within the sub-category of biomaterials. The field of biodesign, on the other hand, as a disciplinary area is still emergent and the literature defining the field is distributed across various publications and areas of research within design. For this reason, the review of terms was limited to those within publications more closely related to design.

Additionally, a brief review of the classification systems used in material libraries was done. It should be noted that many materials libraries and databases are subscription-only or belong to educational institutions where access is limited. Many private, commercial entities view their classification systems as proprietary. Data in this area was generally difficult to locate and review and was consequently, not used in the outcomes of the research.

Materials Designed for the Symbiocene

The third area is the creation of new, experimental biomaterials using the proposed nomenclature and the exhibition of these materials for public display. The materials were created by design students, design faculty, and later by members of the public in a workshop format. A 'tagging' system of the nomenclature was used to guide the organization of the exhibition and herbarium-style samples of material feedstocks were displayed with the material samples. In an effort to connect participants and exhibition viewers with the ecological (rather than geopolitical) origins of the material feedstocks, the World Wildlife Fund's Ecoregion (World Wildlife Fund, 2017) mapping system was used to describe the origin of the feedstocks (when origin information could be identified).

Results and Discussion

Results of Biomaterials and Biodesign Classification Terms

Given the historical origins of biomaterials within the material science literature, classification terms are largely related to the performance of the materials or the material type. These categorization systems are derived from largely reductionist epistemologies and questions of livingness and ecological origins are generally beyond the scope of inquiry. For these reasons, this area of research was largely excluded.

Within biodesign, there is an emerging, yet loosely defined, organization of types of biodesign descriptions amongst design professionals. Within the field of biodesign, there are a plethora of terms used to describe materials including: grown, living, biopolymer, bioplastic, bio-based, bacterial cellulose, mycelium, biofabricated, regenerative, and many others. This list is not intended to be exhaustive, but rather exemplary a quickly growing nomenclature describing materials within an emergent discipline.

To date, some classification systems in biodesign have been proposed. For instance, one proposal separates biodesign into living organisms and dead biomass (Esat and Ahmed-Kristensen, 2018). Similarly, the framework of 'healing materialities' guides designers to connect the biodesign and regenerative design approaches to surpass sustainability in a technocratic paradigm(Pollini and Rognoli, 2024). "Living artefacts" are those that are or were once grown by a living organism to develop the material (Karana *et al.*, 2023) and "grow-made" objects have similar production methods (Keune, 2017; Williams and Collet, 2021). "Material biographies" have also been proposed as a narrative solution to better transparency of the origins of biomaterials and their feedstocks (Rognoli *et al.*, 2022). These and many other design researchers have provided names and definitions to define nuances within the field of biodesign and reshape the way we feel about materials. These names direct our thinking towards new ways of interacting and engaging with all types of materials - living, once living, or never living. To describe an artefact of design as 'living' (Karana, Barati and Giaccardi, 2020)is to challenge to our senses and perceptions of life and the agency of designed objects.

None of these descriptions are exhaustive, nor do they purport to be. Rather they define the relationship between terms in an emerging new language of understanding and relating to other species through our material world. We have yet to thoroughly understand ourselves in this context, where the modern influences of science, design, ecology, and pluralistic

humanity engage in modern living ecologies. It is reasonable that we shall all struggle to name these new experiences and try to connect to our existing frameworks of knowledge. None of them should be considered mutually exclusive and we should expect to see new clarifying terms emerge as the Symbiocene becomes fully realized.

Results of Materials Designed for the Symbiocene

Experimentation with the creation of biomaterials to connect designers and users to feedstock origins and their own symbiotic relationships with materials began in the fall of 2024 and is continuing with several student and faculty collaborators. Contributors to the collection of biomaterials designed for the Symbiocene are tasked with creating material samples using feedstocks of identified origins, positioning those feedstocks within an ecoregional context, telling the ecological origin story of the materials, and categorizing the material using the terms presented in the proposed nomenclature described in detail below. The material samples were developed into a material library format and displayed for public interaction. Contributors quickly identified that there is a lack of transparency in most material feedstocks that are readily available for purchase and were asked to describe the ecoregional origins of these materials as “Unknown”.

Proposed Nomenclature for Material Design in the Symbiocene

This research proposes a nomenclature to reconnect designers, students, and consumers with their local bioregions through material tagging and identification systems. The original complete proposed list of thirteen terms included a nuanced collection derived from several disciplinary areas, such including ecological sciences, economics and business, social sciences, and design disciplines. This list is not exhaustive, but rather a more thorough representation of the terms currently used in the biodesign literature in an inconsistent way.

- **Ecological:** Sourced, processed, or used in ways that minimize environmental impact and support the health of ecosystems.
- **Biological:** Derived from living organisms, including plants, animals, and microorganisms. Sometimes, but not necessarily, offering renewable and biodegradable end-of-life solutions.
- **Living:** Alive or maintain living cells, often used in biodesign where the material continues to grow or change over time.
- **Regenerative**: Produced in a way that not only avoids depleting resources but also restores or enhances the surrounding ecosystem, often turning waste into valuable resources.
- **Biosequestered:** Feedstocks have absorbed and stored carbon, heavy metals, or other pollutants from the environment, contributing to environmental cleanup (e.g., "Salmon Gold" which is mined from mining waste sedimentation ponds using bacterial sequestration (Resolve, 2024)).
- **Imported:** Brought into a region from another area, often for specific purposes, without necessarily integrating into the local ecosystem.

- **Native:** Originate from and have evolved within a particular region or ecosystem over a long period, naturally adapting to the local environment.
- **Indigenous:** Naturally occurring in a specific region, often synonymous with native but can emphasize cultural and historical significance.
- **Endemic:** Uniquely found only in a particular geographic area, often highly specialized and not found elsewhere.
- **Naturalized:** Non-native but have adapted to a new environment and now grow or occur naturally in that region without human intervention. Do not demonstrate invasive characteristics.
- **Domesticated:** Selectively bred or genetically modified by humans to enhance certain traits, making them more useful or manageable for human purposes.
- **Introduced:** Brought to new regions by human activity, either intentionally or accidentally, and established themselves in the local environment.
- **Invasive:** Non-native materials that disrupt local ecosystems by outcompeting native species, often leading to ecological imbalances.

The application of these terms evokes various emotional and relational responses when used to describe a material, feedstock, or the species that grew the feedstock. Some terms, for instance, are more anthropocentric while others are more ecocentric. Terms such as *imported* and *domesticated* are more commonly used to serve socio-political interests. To the contrary, words such as *living, endemic, regenerative*, and *native* are frequently more associated with interests of ecosystems. Furthermore, some of these terms induce more utilitarian values of natural systems while others in induce more intrinsic values. For instance, terms such as *imported, introduced*, and *domesticated* suggest that living species are at human disposal for use, while other terms such as *native, endemic*, and *indigenous* provide a more intrinsic value framing of these other species who deserve value because they are.

To provide two examples of the application of the nomenclature, we will consider materials made from eucalyptus and those made from water hyacinth. Eucalyptus is native to Australia where it is well-adapted to the local soil types and is domesticated for regenerative planting strategies to restore local ecological balance. Eucalyptus in Portugal, on the other hand, is a domesticated species which has been introduced into a foreign ecological context where it behaves as an invasive species. In the Portuguese coastal ecoregion, it alters the native soil types out of ecological balance, changing the fire cycle of the local ecosystem. It also reduces the levels of native biodiversity through the homogenization of production. While eucalyptus provides the same basic feedstock of paper pulp from these two ecoregional contexts, cultivation of this species has significant impact on the stability of biotic systems in each respective place.

Water hyacinth as another example of a species that is well-adapted and symbiotic balance in one ecosystem but aggressively invasive in others. Native to Brazil, it is relatively stable in its native range and does not demonstrate any negative ecological consequences. However, in parts of Africa and Southeast Asia, it is aggressively invasive, clogging waterways, disturbing ecological balance, and disrupting economic activity. In these African and

Southeast Asian contexts, it is harvested to remove the harmful effects, dried into a material that can be woven, and used to make baskets that are sold to international consumers at companies worldwide. To the contrary, the extraction of water hyacinth in a Brazilian context causes ecological harm because it removes the water purification and pollination benefits that water hyacinth provides within its native ecosystem. In the African and Southeast Asian context, this material has been commodified to avoid negative ecological impacts can be considered regenerative because it is actively healing and restoring the native systems.

These two examples demonstrate how the very same species can have vastly distinct ecological impacts, depending on the ecoregion of origin. And to date, there are few to no transparent systems in place to enable customers, designers, or policymakers to engage in a meaningful way with the gravity of these inherent issues. A more nuanced nomenclature is a first attempt to shed light on this issue within the field of biodesign.

Upon further reflection and practical application, the nuanced definitions of thirteen terms were difficult to apply when many of the material feedstocks were untraceable and others were not relevant to any of the materials created. Endemic, for instance, signifies extremely specific ecoregional origins and was not yet applicable within the context of highly globalized supply chains. Other terms such as native/indigenous and imported/introduced have meaning in specific disciplinary contexts but lose their nuanced necessity in the context of biomaterials and design.

Other practical issues emerged in using the more robust tagging system such as how to communicate such complexity in communication with the public and creating a visual language that retained its meaning for users and exhibition viewers without the need for additional oral explanation. For these reasons, the final nomenclature included the following terms:

- **Ecological:** Sourced, processed, or used in ways that minimize environmental impact and support the health of ecosystems.
- **Biological:** Derived from living organisms, including plants, animals, and microorganisms. Sometimes, but not necessarily, offering renewable and biodegradable end-of-life solutions.
- **Living:** Alive or maintain living cells, often used in biodesign where the material continues to grow or change over time.
- **Regenerative**: Produced in a way that not only avoids depleting resources but also restores or enhances the surrounding ecosystem, often turning waste into valuable resources.
- **Biosequestered:** Feedstocks have absorbed and stored carbon, heavy metals, or other pollutants from the environment, contributing to environmental cleanup (e.g., "Salmon Gold" which is mined from mining waste sedimentation ponds using bacterial sequestration (Resolve, 2024)).
- **Native:** Originate from and have evolved within a particular region or ecosystem over a long period, naturally adapting to the local environment, often with indigenous significance.

- **Naturalized:** Non-native but have adapted to a new environment and now grow or occur naturally in that region without human intervention. Do not demonstrate invasive characteristics.
- **Domesticated:** Selectively bred or genetically modified by humans to enhance certain traits, making them more useful or manageable for human purposes.
- **Introduced:** Brought to new regions by human activity, either intentionally or accidentally, and established themselves in the local environment.
- **Invasive:** Non-native materials that disrupt local ecosystems by outcompeting native species, often leading to ecological imbalances.

Notice that the term 'local', though widely used to describe materials, was intentionally excluded from this nomenclature as it does not provide any information regarding the ecological origins of the material. In practice, it does not differentiate between feedstock species that are locally domesticated and those that are native, nor does it imply any positive ecological impacts beyond a lowered transportation footprint. In general, its overuse in everyday communication makes it less relevant in the context of sustainability.

Conclusion

Materials in the Symbiocene and a Vision for the Future

Glenn Albrecht's (2016) *Symbiocene* envisions a future where humans exist in symbiotic relationships with ecosystems. To achieve this, we must rethink the language and classifications we use to describe materials. Plastic, for example, could be recognized as a *prehistoric biomaterial*, reflecting its origins and impacts. Biomaterials of today, however, must be understood within their current ecological, social, and cultural contexts. The proposed nomenclature aligns with this vision by creating language to facilitate transparency around material origins and impacts. It empowers designers, consumers, and policymakers to engage more deeply with their local and global ecoregions and make more informed material choices.

Existing material libraries categorize materials by type (e.g., mineral-derived, protein-derived, polymers, textiles) but rarely connect them to ecological or geographic origins. This research advocates for integrating eco-regional classifications, such as those proposed by the World Wildlife Fund's Ecoregions Map (World Wildlife Fund, 2017), to reconnect materials to their places of origin. By identifying the specific ecosystems from which materials are sourced, we can:

- Foster greater accountability in systems of production and consumption.
- Enable consumers to understand material impacts on local and global scales.
- Support biodesigners in creating regionally adapted, symbiotic production processes.
- Develop relational, embodied, material connections between humans and more-than-human species.

This level of transparency helps prevent the replication of extractive systems under the guise of sustainability.

The emerging dominance of biomaterials in our daily lives offers an opportunity to transcend the extractive systems of the Anthropocene and enter the Symbiocene. However, this requires a fundamental shift in how we classify, understand, and feel about materials. The proposed nomenclature serves as a step toward this shift by reconnecting materials to their ecological and cultural origins. To know a material only as "plastic" or "biomaterial" is to ignore its complex visceral relationships between ecosystems and humans. By introducing a system of tagging and identification rooted in ecological contexts, we can inspire new ways of knowing and engaging with materials—ways that honor their origins and foster symbiotic relationships between humans and the rest of the living, breathing, growing, nurturing, sensing, feeling, communicating species with whom we share our dynamic and quickly changing world.

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