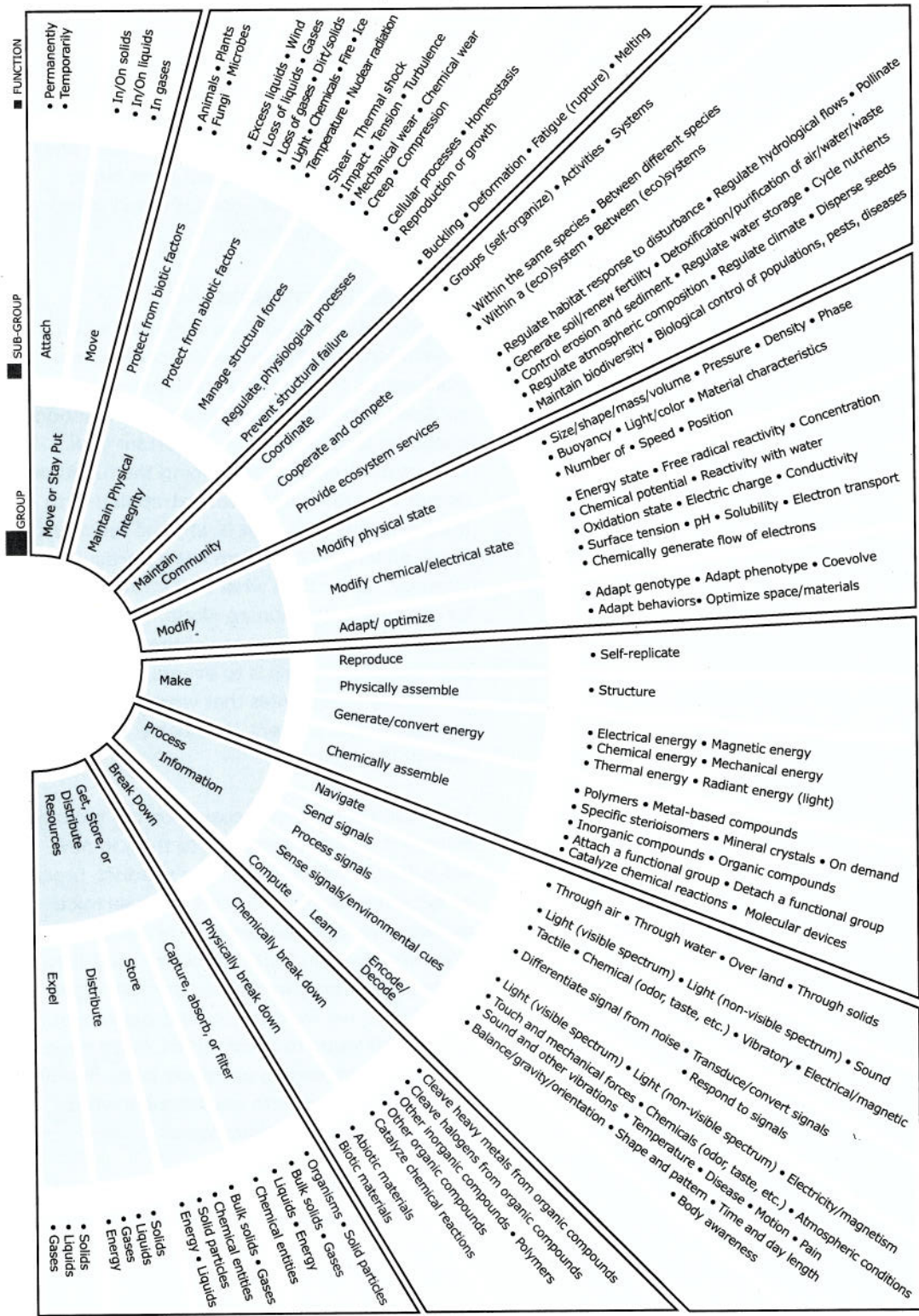


Biomimicry Taxonomy



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BIOLOGY ORGANIZED BY CHALLENGE

AskNature.org is a good resource for finding strategies and can help you come up with the design principle. It uses a classification system, the Biomimicry Taxonomy, to organize how organisms meet different challenges. That is, the biology is organized by function. The ways that organisms solve those challenges are strategies. Put another way, the strategy is how an organism does something and the function is why it does it.

Understanding the Biomimicry Taxonomy provides a novel way for designers and biologists to collaborate and approach a design challenge in a life-friendly way. Think of it as a linguistic bridge between biologists and designers; the taxonomy is based on how organisms function but uses terms familiar to engineers, designers, and architects.

HOW THE BIOMIMICRY TAXONOMY WORKS

A moth's challenge is that it must protect itself from animals that want to eat it.

The function—*why* it does it—is presented in the Biomimicry Taxonomy as a hierarchy of functions stated as verbs: Maintain physical integrity > Protect from biotic factors > (Protect from) Animals.

How the moth does it—its strategy—is by using anti-reflective eyes to avoid detection in moonlight and, more specifically, by using nanoscale protrusions within its eyes. This principle shows up in the summary sentence on each strategy page.

As expected when working with nature's geniuses, strategies often are associated with more than one function. In the moth example given above, the primary function is "Protect from animals." But the strategy also fits the function of "(Modify physical state) light/color." Therefore, the moth eye strategy will show up when browsing through both functions.

To make it easier to work with the taxonomy, the functions as shown in AskNature are in a hierarchy, with 8 groups made up of 30 subgroups containing more than 160 functions. In the pathway shown above, "Maintain physical integrity" is a group, "Protect from biotic factors" is a subgroup, and "(Protect from) Animals" is the function.

WEAKNESSES AND STRENGTHS

The Biomimicry Taxonomy emerged when the Biomimicry Guild gathered functional data from nature that became the initial strategies on AskNature. Classifying these in a taxonomy based on function was an important task, but not at all easy. Just defining the function names was difficult, as was extrapolating to human challenges. That is why the functions focus on why an organism has a particular strategy, rather than what that strategy could be used for in the human world. This is both a strength and a weakness of the taxonomy, and one of our goals is to eventually create alternative taxonomies that work better for various technical users, thus better bridging the terminology gaps.

The main strength of focusing on the biological functions is that it forces us to think in new ways about what we want our product, process, or system to do. Do we want it to use toxic materials to clean bacteria off of surfaces (Would nature do that?) or do we want it to protect itself from microbes (the way algae would)? Do we want to produce packaging that takes 1000 years to break down, or do we want to produce packaging as nature does, meeting multiple functions with one material while ultimately being biodegradable?

By asking these "deeper" questions around function, rather than having a preconceived idea of what we want to produce, we can broaden the potential solution space of ideas. Indeed, getting to function is what the scoping phase is all about.



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