A biological strategy is a characteristic, mechanism, or process that an organism or ecosystem exhibits to accomplish a particular function within a particular context.

The main elements of a biological strategy are:

- The function of the organism, as in what is the organism trying to accomplish?

- The mechanism of the organism, describe how the organism does the function.

- The ‘organism context’ of the organism performing the function. This could be a place, condition, or situation.

- The ‘experimental contex’t of the organism performing the function. This is what the researchers/scientists are testing.

- The organism or ecosystem which is performing the function.

- The part of the organism that is used to perform the function if it is stated in the text.

Make sure the biological strategy is composed of the function, mechanism, ‘organism context’, organism, and part of the organism.

Text: Building a home from foam-túngara frog foam nest architecture and three-phase construction process. frogs that build foam nests floating on water face the problems of over-dispersion of the secretions used and eggs being dangerously exposed at the foam : air interface. nest construction behaviour of tungara frogs, engystomops pustulosus, has features that may circumvent these problems. pairs build nests in periodic bursts of foam production and egg deposition, three discrete phases being discernible. the first is characterized by a bubble raft without egg deposition and an approximately linear increase in duration of mixing events with time. this phase may reduce initial over-dispersion of foam precursor materials until a critical concentration is achieved. the main building phase is marked by mixing events and start-to-start intervals being nearly constant in duration. during the final phase, mixing events do not change in duration but intervals between them increase in an exponential-like fashion. pairs joining a colonial nesting abbreviate their initial phase, presumably by exploiting a pioneer pair's bubble raft, thereby reducing energy and material expenditure, and time exposed to predators. finally, eggs are deposited only in the centre of nests with a continuously produced, approximately 1 cm deep egg-free cortex that protectively encloses hatched larvae in stranded nests.

Function: protect hatched larvae

Mechanism: building nests

Organism Context: periodic bursts of foam production and egg deposition on water

Experimental Context: None

Organism: Túngara frog

Part of: Nest

Strategy: Túngara frogs protectively enclose hatched larvae by building nests during periodic bursts of foam production and egg deposition on water

Text: Harbor seal vibrissa morphology suppresses vortex-induced vibrations. Harbor seals (Phoca vitulina) often live in dark and turbid waters, where their mystacial vibrissae, or whiskers, play an important role in orientation. Besides detecting and discriminating objects by direct touch, harbor seals use their whiskers to analyze water movements, for example those generated by prey fish or by conspecifics. Even the weak water movements left behind by objects that have passed by earlier can be sensed and followed accurately (hydrodynamic trail following). While scanning the water for these hydrodynamic signals at a swimming speed in the order of meters per second, the seal keeps its long and flexible whiskers in an abducted position, largely perpendicular to the swimming direction. Remarkably, the whiskers of harbor seals possess a specialized undulated surface structure, the function of which was, up to now, unknown. Here, we show that this structure effectively changes the vortex street behind the whiskers and reduces the vibrations that would otherwise be induced by the shedding of vortices from the whiskers (vortex-induced vibrations). Using force measurements, flow measurements and numerical simulations, we find that the dynamic forces on harbor seal whiskers are, by at least an order of magnitude, lower than those on sea lion (Zalophus californianus) whiskers, which do not share the undulated structure. The results are discussed in the light of pinniped sensory biology and potential biomimetic applications.

Function: to reduce vibrations

Mechanism: undulated surface structure

Organism Context: while scanning the water for hydrodynamic signals

Experimental Context: force measurements, flow measurements, and numerical simulations

Organism: harbor seal

Part of: mystacial vibrissae

Strategy: Harbor seal mystacial vibrissae reduce vibrations by having an undulated surface structure.

1. W2005779387
   * Sample: "title": "On the buoyancy of the pearly nautilus", "abstract": "nautilus macromphalus sowerby when freshly caught was close to neutral buoyancy having a weight in sea water of about 0\u20132% of its weight in air. the animals without their shells varied considerably in density but the volume of the shell was an approximately constant fraction of the total volume of the whole animal and whole animals were brought approximately to the same density by havingmore or less liquid inside the chambers of the shell. about 80 % of the gas space in the shell was used to support the weight of the shell itself in sea water.in an adult animal the centre of buoyancy was found to be about 6 mm above the centre of gravity, which made the animal very stable in its natural swimming position, a couple of about 350 g. cm being required to turn it through 90\u00b0. the pearly partsof the chamber walls were impermeable to sea water but the chalky and horny siphuncular tubes joining the septal necks were very porous. the most newly formed tenor so chambers were the only ones to contain liquids in appreciable volume and theydid this in diminishing amounts from the newest to the oldest. the watery liquids found within the chambers were always hypotonic to sea water and sometimes markedly so; they contained principally sodium and chloride ions. one animal was in the process of forming a new chamber, this incomplete chamber was completely full of liquidwith an osmolarity close to that of sea water but differing in composition from seawater."
   * Baseline:
     + Organism: pearly nautilus
     + Part Of: shell
     + Function: support the weight of the shell
     + Mechanism: having more or less liquid inside the chambers of the shell
     + Context: in an adult animal
     + Strategy: pearly nautilus support the weight of the shell by having more or less liquid inside the chambers of the shell.
   * New:
     + Organism: pearly nautilus
     + Part Of: shell
     + Function: support the weight of the shell
     + Mechanism: having more or less liquid inside the chambers of the shell
     + Organism Context: in sea water
     + Experimental Context: in an adult animal
     + Strategy: pearly nautilus support the weight of the shell by having more or less liquid inside the chambers of the shell in sea water.
   * Notes:
     + Baseline
     + Correct
       - Organism, Function, Mechanism, Part Of
       - Strategy is missing information.
         * Context
     + Incorrect
       - Context → was close to neutral buoyancy
     + ⅚
     + New
     + 7/7
     + Context could also be was close to neutral buoyancy
2. W2152749757
   * Sample: “title": "How strong is intracanopy leaf plasticity in temperate deciduous trees", "abstract": "intracanopy plasticity in tree leaf form is a major determinant of whole-plant function and potentially of forest understory ecology. however, there exists little systematic information for the full extent of intracanopy plasticity, whether it is linked with height and exposure, or its variation across species. for arboretum-grown trees of six temperate deciduous species averaging 13-18 m in height, we quantified intracanopy plasticity for 11 leaf traits across three canopy locations (basal-interior, basal-exterior, and top). plasticity was pronounced across the canopy, and maximum likelihood analyses indicated that plasticity was primarily linked with irradiance, regardless of height. intracanopy plasticity (the quotient of values for top and basal-interior leaves) was often similar across species and statistically indistinguishable across species for several key traits. at canopy tops, the area of individual leaves was on average 0.5-0.6 times that at basal-interior, stomatal density 1.1-1.5 times higher, sapwood cross-sectional area up to 1.7 times higher, and leaf mass per area 1.5-2.2 times higher; guard cell and stomatal pore lengths were invariant across the canopy. species differed in intracanopy plasticity for the mass of individual leaves, leaf margin dissection, ratio of leaf to sapwood areas, and stomatal pore area per leaf area; plasticity quotients ranged only up to \u22482. across the six species, trait plasticities were uncorrelated and independent of the magnitude of the canopy gradient in irradiance or height and of the species' light requirements for regeneration. this convergence across species indicates general optimization or constraints in development, resulting in a bounded plasticity that improves canopy performance."
   * Baseline:
     + Organism: temperate deciduous trees
     + Part Of: leaf
     + Function: improve canopy performancel
     + Mechanism: plasticity in tree leaf form
     + Context: arboretum-grown trees
     + Strategy: Temperate deciduous trees improve canopy performance by plasticity in tree leaf form.
   * Baseline:
     + Organism: temperate deciduous trees
     + Part Of: leaf
     + Function: improve canopy performancel
     + Mechanism: intracanopy plasticity
     + Environment: arboretum
     + Context: tree leaf form
     + Strategy: Temperate deciduous trees improve canopy performance by plasticity in tree leaf form.
   * Notes:
     + Baseline
       - Correct
         * Organism, Function, Mechanism, Part Of
         * Strategy is missing information.

Context

* + - * Incorrect
        + Context → whole-plant function and potentially of forest understory ecology
        + Strategy should be if perfect world→ plasticity in tree leaf form improves canopy performance in Temperate deciduous trees.
      * 5/6
    - New
      * 7/7
      * Context could be whole-plant function and potentially of forest understory ecology

1. W2025490238
   * Sample: "title": "A biomechanical perspective on the role of large stem volume and high water content in baobab trees (Adansonia spp.; Bombacaceae)", "abstract": "the stems of large trees serve in transport, storage, and support; however, the degree to which these roles are reflected in their morphology is not always apparent. the large, water-filled stems of baobab trees (adansonia spp.) are generally assumed to serve a water storage function, yet recent studies indicate limited use of stored water. through an analysis of wood structure and composition, we examined whether baobab morphology reflects biomechanical constraints rather than water storage capacity in the six madagascar baobab species. baobab wood has a high water content (up to 79%), low wood density (0.09-0.17 g \u00b7 cm(-3)), high parenchyma content (69-88%), and living cells beyond 35 cm into the xylem from the cambium. volumetric construction cost of the wood is several times lower than in more typical trees, and the elastic modulus approaches that of parenchyma tissue. safety factors calculated from estimated elastic buckling heights were low, indicating that baobabs are not more overbuilt than other temperate and tropical trees, yet the energy investment in stem material is comparable to that in temperate deciduous trees. furthermore, the elastic modulus of the wood decreases with water content, such that excessive water withdrawal from the stem could affect mechanical stability."
   * Baseline:
     + Organism: baobab tree
     + Part Of: wood
     + Function: support
     + Mechanism: large, water-filled stems
     + Context: water storage
     + Strategy: The large, water-filled stems of baobab trees support the tree by serving as a water storage mechanism.
   * New:
     + Organism: baobab tree
     + Part Of: stem
     + Function: support
     + Mechanism: large, water-filled stems
     + Environment: Madagascar
     + Context: water storage
     + Strategy: Baobab trees support themselves with large, water-filled stems that store water.
   * Notes:
     + Baseline
     + Correct
       - Organism, Function, Mechanism, Context
       - Strategy is missing information.
         * Context
     + Incorrect
       - Part Of → stems
     + 5/6
     + But, It probably should be
       - The large, water-filled stems of baobab trees support the tree with mechanical stability rather than serving as a water storage mechanism.
     + New
       - 7/7
2. W2112209842
   * Sample: "title": "Hydrophobic trichome layers and epicuticular wax powders in Bromeliaceae", "abstract": "the distinctive foliar trichome of bromeliaceae has promoted the evolution of an epiphytic habit in certain taxa by allowing the shoot to assume a significant role in the uptake of water and mineral nutrients. despite the profound ecophysiological and taxonomic importance of this epidermal structure, the functions of nonabsorbent trichomes in remaining bromeliaceae are not fully understood. the hypothesis that light reflection from these trichome layers provides photoprotection was not supported by spectroradiometry and fluorimetry in the present study; the mean reflectance of visible light from trichome layers did not exceed 6.4% on the adaxial surfaces of species representing a range of ecophysiological types nor was significant photoprotection provided by their presence. several reports suggesting water repellency in some terrestrial bromeliaceae were investigated. scanning electron microscopy (sem) and a new technique-fluorographic dimensional imaging (fdi)-were used to assess the interaction between aqueous droplets and the leaf surfaces of 86 species from 25 genera. in the majority of cases a dense layer of overlapping, stellate or peltate trichomes held water off the leaf epidermis proper. in the case of hydrophobic tank-forming tillandsioideae, a powdery epicuticular wax layer provided water repellency. the irregular architecture of these indumenta resulted in relatively little contact with water droplets. most mesic terrestrial pitcairnioideae examined either possessed glabrous leaf blades or hydrophobic layers of confluent trichomes on the abaxial surface. thus, the present study indicates that an important ancestral function of the foliar trichome in bromeliaceae was water repellency. the ecophysiological consequences of hydrophobia are discussed."
   * Baseline:
     + Organism: Bromeliaceae
     + Part Of: leaf epidermis
     + Function: water repellency
     + Mechanism: dense layer of overlapping, stellate or peltate trichomes
     + Context: majority of cases
     + Strategy: the foliar trichome in bromeliaceae provides water repellency by creating a dense layer of overlapping, stellate or peltate trichomes on the leaf epidermis.
   * New:
     + Organism: Bromeliaceae
     + Part Of: leaf epidermis
     + Function: water repellency
     + Mechanism: dense layer of overlapping, stellate or peltate trichomes
     + Environment: on the leaf epidermis
     + Context: majority of cases
     + Strategy: the foliar trichome in bromeliaceae provides water repellency by creating a dense layer of overlapping, stellate or peltate trichomes on the leaf epidermis.
   * Notes:
     + Baseline
       - Correct
         * Organism, Function, Mechanism, Part Of
         * Strategy is missing information → Context, added extra info
       - Incorrect
         * Context → an important ancestral function
       - ⅚
     + New
       - 6/7
       - Context → an important ancestral function
3. W2127657288
   * Sample: "title": "The incidence and implications of clouds for cloud forest plant water relations.", "abstract": "although clouds are the most recognisable and defining feature of tropical montane cloud forests, little research has focussed on how clouds affect plant functioning. we used satellite and ground-based observations to study cloud and leaf wetting patterns in contrasting tropical montane and pre-montane cloud forests. we then studied the consequences of leaf wetting for the direct uptake of water accumulated on leaf surfaces into the leaves themselves. during the dry season, the montane forest experienced higher precipitation, cloud cover and leaf wetting events of longer duration than the pre-montane forest. leaf wetting events resulted in foliar water uptake in all species studied. the capacity for foliar water uptake differed significantly between the montane and pre-montane forest plant communities, as well as among species within a forest. our results indicate that foliar water uptake is common in these forest plants and improves plant water status during the dry season."
   * Baseline:
     + Organism: tropical montane and pre-montane cloud forest plants
     + Part Of: leaves
     + Function: improve plant water status
     + Mechanism: foliar water uptake
     + Context: during the dry season
     + Strategy: Foliar water uptake is common in tropical montane and pre-montane cloud forest plants and improves plant water status during the dry season.
   * New:
     + Organism: plants
     + Part Of: leaves
     + Function: improve plant water status
     + Mechanism: foliar water uptake
     + Environment: tropical montane and pre-montane cloud forests
     + Context: during the dry season
     + Strategy: Foliar water uptake is common in tropical montane and pre-montane cloud forest plants and improves plant water status during the dry season.
   * Notes:
     + Baseline
       - Correct
         * Organism, Function, Mechanism, Part Of, Context
         * Strategy is missing information

Part Of

* + - * 6/6
    - New
      * 7/7
      * But, organism could be more specific