**Introduction**

This document involves testing a prompt in which we ask GPT-3 to find the function, mechanism, and context.

**Prompt**

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

Find the mechanism of the organism, describe how the organism does the function.

Find the context of the organism performing the function. This could be a place, condition, or situation.

Text: {}

Function:

**Structure of Content**

* Each entry has a
  + Paper Id
  + Summary generated from GPT-3 Da Vinci consisting og
    - Biological Strategy
    - Organism
    - Part of
    - Function
    - Mechanisms
    - Context
  + My notes and analysis

**Content**

1. W2103410568
   * Sample: "title": "Building a home from foam\u2014t\u00fangara frog foam nest architecture and three-phase construction process", "abstract": "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."
   * Strategy:
     + Function: The túngara frog is trying to build a home from foam in order to protect its eggs.
     + Mechanisms: The túngara frog builds its foam nest by producing secretions and mixing them with air to create bubbles. The bubbles are then deposited in a central location in the nest.
     + Context: The túngara frog builds its foam nest in a body of water, such as a pond or lake.
   * Notes:
     + The context and function are correct, but the mechanism is incorrect.
     + GPT creates a good mechanism based on what the given text, but it is too abstractive. It creates the wrong conclusion after extracting some of the right parts.
       - It should be something like, “creates bubble rafts, and deposits eggs in the centre”
     + WrongF
     + 2/3
2. W2138292607
   * Sample: A nocturnal mammal, the greater mouse-eared bat, calibrates a magnetic compass by the sun. recent evidence suggests that bats can detect the geomagnetic field, but the way in which this is used by them for navigation to a home roost remains unresolved. the geomagnetic field may be used by animals both to indicate direction and to locate position. in birds, directional information appears to be derived from an interaction of the magnetic field with either the sun or the stars, with some evidence suggesting that sunset/sunrise provides the primary directional reference by which a magnetic compass is calibrated daily. we demonstrate that homing greater mouse-eared bats (myotis myotis) calibrate a magnetic compass with sunset cues by testing their homing response after exposure to an altered magnetic field at and after sunset. magnetic manipulation at sunset resulted in a counterclockwise shift in orientation compared with controls, consistent with sunset calibration of the magnetic field, whereas magnetic manipulation after sunset resulted in no change in orientation. unlike in birds, however, the pattern of polarization was not necessary for the calibration. for animals that occupy ecological niches where the sunset is rarely observed, this is a surprising finding. yet it may indicate the primacy of the sun as an absolute geographical reference not only for birds but also within other vertebrate taxa.
   * Strategy:
     + Function: The greater mouse-eared bat is trying to calibrate a magnetic compass by the sun.
     + Mechanisms: The bat detects the geomagnetic field and uses it to navigate to a home roost. The geomagnetic field is used by animals to indicate direction and to locate position.
     + Context: The bat is calibrating the magnetic compass with sunset cues.
   * Notes:
     + CorrectF
3. W2005539166
   * Sample: "title": "Polarization sensitivity in two species of cuttlefish - Sepia plangon (Gray 1849) and Sepia mestus (Gray 1849) - demonstrated with polarized optomotor stimuli.", "abstract": "the existence of polarization sensitivity (ps), most likely resulting from the orthogonal arrangement of microvilli in photoreceptors, has been proposed in cephalopods for some time, although it has rarely been examined behaviourally. here, we tested the mourning cuttlefish, sepia plangon, and the reaper cuttlefish, sepia mestus, for polarization sensitivity using a large-field optomotor stimulus containing polarization contrast. polaroid filter drums with stripes producing alternating e-vectors were rotated around free-moving animals. polarized optomotor responses were displayed, and these responses were similar to those performed in response to a black-and-white, vertically-striped drum, whereas no responses were displayed to a plain polarizing control drum producing just a vertical e-vector. this indicates that the animals are able to see the contrast between adjacent stripes in the polarizing drum. to our knowledge, this is the first demonstration of functional polarization sensitivity in cuttlefish."
   * Strategy:
     + Function: The function of the organism is to be able to see the contrast between adjacent stripes in the polarizing drum.
     + Mechanisms: The mechanism of the organism is that it has polarizing filters in its photoreceptors that allow it to see the contrast between adjacent stripes.
     + Context: The context of the organism is that it is free-moving and able to see the polarizing optomotor stimulus.
   * Notes:
     + CorrectF
4. W2151557512
   * Sample: "title": "Identification and characterization of a multidomain hyperthermophilic cellulase from an archaeal enrichment.", "abstract": "archaea are microorganisms that use a wide range of carbon and energy sources. graham et al. describe an archaeal consortium that can grow at temperatures above 90 \u00b0c using crystalline cellulose as a carbon source, with potential applications in enzymatic degradation under extreme conditions."
   * Strategy:
     + Function: The function of the organism is to identify and characterize a multidomain hyperthermophilic cellulase from an archaeal enrichment.
     + Mechanisms: The mechanism of the organism is to use a wide range of carbon and energy sources.
     + Context: The context of the organism is to grow at temperatures above 90 °c using crystalline cellulose as a carbon source.
   * Notes:
     + <https://pubmed.ncbi.nlm.nih.gov/21730956/>
       - Abstract may not be correct
     + The function is not correct, GPT takes the function of the paper, not the organism
     + The context should be the function
     + The mechanism is correct
     + The context should be extreme conditions
     + WrongF
     + 1/3
5. W2160542693
   * Sample: "title": "DIFFERENCES IN POLYSACCHARIDE STRUCTURE BETWEEN CALCIFIED AND UNCALCIFIED SEGMENTS IN THE CORALLINE CALLIARTHRON CHEILOSPORIOIDES (CORALLINALES, RHODOPHYTA) 1", "abstract": "the articulated coralline calliarthron cheilosporioides manza produces segmented fronds composed of calcified segments (intergenicula) separated by uncalcified joints (genicula), which allow fronds to bend and reorient under breaking waves in the wave-swept intertidal zone. genicula are formed when calcified cells decalcify and restructure to create flexible tissue. the present study has identified important differences in the main agaran disaccharidic repeating units [\u21923)-\u03b2-d-galp (1\u2192 4)-\u03b1-l-galp(1\u2192] synthesized by genicular and intergenicular segments. based on chemical and spectroscopical analyses, we report that genicular cells from c. cheilosporioides biosynthesize a highly methoxylated galactan at c-6 position with low levels of branching with xylose side stubs on c-6 of the [\u21923)-\u03b2-d-galp (1\u2192] units, whereas intergenicular segments produce xylogalactans with high levels of xylose and low levels of 6-o-methyl \u03b2-d-gal units. these data suggest that, during genicular development, xylosyl branched, 3-linked \u03b2-d-galp units present in the xylogalactan backbones from intergenicular walls are mostly replaced by 6-o-methyl-d-galactose units. we speculate that this structural shift is a consequence of a putative and specific methoxyl transferase that blocks the xylosylation on c-6 of the 3-linked \u03b2-d-galp units. changes in galactan substitutions may contribute to the distinct mechanical properties of genicula and may lend insight into the calcification process in coralline algae."
   * Strategy:
     + Function: The organism is trying to create flexible tissue.
     + Mechanisms: The organism does this by decalcifying and restructuring calcified cells.
     + Context: The organism is performing this function in the wave-swept intertidal zone.
   * Notes:
     + Could be more specific, but correct nonetheless
     + CorrectF
6. W2130285640
   * Sample: "title": "Foam nest components of the t\u00fangara frog: a cocktail of proteins conferring physical and biological resilience", "abstract": "the foam nests of the tungara frog (engystomops pustulosus) form a biocompatible incubation medium for eggs and sperm while resisting considerable environmental and microbiological assault. we have shown that much of this behaviour can be attributed to a cocktail of six proteins, designated ranaspumins (rsn-1 to rsn-6), which predominate in the foam. these fall into two discernable classes based on sequence analysis and biophysical properties. rsn-2, with an amphiphilic amino acid sequence unlike any hitherto reported, exhibits substantial detergent-like surfactant activity necessary for production of foam, yet is harmless to the membranes of eggs and spermatozoa. a further four (rsn-3 to rsn-6) are lectins, three of which are similar to fucolectins found in teleosts but not previously identified in a land vertebrate, though with a carbohydrate binding specificity different from previously described fucolectins. the sixth, rsn-1, is structurally similar to proteinase inhibitors of the cystatin class, but does not itself appear to exhibit any such activity. the nest foam itself, however, does exhibit potent cystatin activity. rsn-encoding genes are transcribed in many tissues of the adult frogs, but the full cocktail is present only in oviduct glands. combinations of lectins and cystatins have known roles in plants and animals for defence against microbial colonization and insect attack. tungara nest foam displays a novel synergy of selected elements of innate defence plus a specialized surfactant protein, comprising a previously unreported strategy for protection of unattended reproductive stages of animals."
   * Strategy:
     + Function: The túngara frog is trying to create a foam nest that will protect its eggs and sperm from the environment and potential predators.
     + Mechanisms: The frog produces six proteins, known as ranaspumins, which work together to create a foam nest. Three of the ranaspumins are lectins, which bind to carbohydrates and help to protect the eggs and sperm from predators. The other three proteins are cystatins, which inhibit proteinase activity and help to protect the foam nest from microbial colonization.
     + Context: The túngara frog produces foam nests in tropical environments. The foam nests are typically found near water sources, such as ponds or streams.
   * Notes:
     + The function is correct.
     + The mechanism mixes up information found in the passage. But it is almost correct.
     + Furthermore, the context is a hallucination.
       - <https://www.unite.ai/preventing-hallucination-in-gpt-3-and-other-complex-language-models/>
     + WrongF
     + 1.5/3
7. W2168114966
   * Sample: "title": "The suctorial organ of the Solifugae (Arachnida, Solifugae)", "abstract": "the ability of members of the arachnid order solifugae to climb smooth, vertical surfaces and the organs involved in this behavior are investigated. macroscopic, microscopic, and scanning electron microscopic observations are made of a palpal organ called the suctorial organ. observations of the behavior but not the microstructure have been made in the past. histological examination illustrates the internal gross anatomy of this structure and scanning electron microscopy demonstrates the fine structure in adults of four genera: eremobates (eremobatidae), eremochelis (eremobatidae), eremorhax (eremobatidae), ammotrechula (ammotrechidae), as well as an unidentified late stage immature and third stage instar. the suctorial organ is most likely primarily used for prey capture in the wild. q 2005 elsevier ltd. all rights reserved."
   * Strategy:
     + Function: The suctorial organ of the Solifugae is used for prey capture.
     + Mechanism: The suctorial organ is a palpal organ that is used to climb smooth, vertical surfaces. The histological examination illustrates the internal gross anatomy of this structure and scanning electron microscopy demonstrates the fine structure in adults of four genera: eremobates (eremobatidae), eremochelis (eremobatidae), eremorhax (eremobatidae), ammotrechula (ammotrechidae), as well as an unidentified late stage immature and third stage instar.
     + Context: he suctorial organ is most likely primarily used for prey capture in the wild
   * Notes:
     + CorrectF
     + Technically, it is correct, but the Mechanism is too specific.
       - The first sentence is what we need
       - The suctorial organ is a palpal organ that is used to climb smooth, vertical surfaces.
8. W1589686983
   * Sample: "title": "On the Mound of Macrotermes michaelseni as an Organ of Respiratory Gas Exchange", "abstract": "patterns and rates of air movements in the mounds and nests of macrotermes michaelseni were studied using tracer methods. wind is a significant source of energy for powering nest ventilation, despite the mound being a completely enclosed structure. nests are ventilated by a tidal movement of air driven by temporal variation in wind speed and wind direction. density gradients sufficiently steep to drive bulk flow by natural convection will be rare. however, metabolism-induced buoyant forces may interact with wind energy in a way that promotes homeostasis of the mound atmosphere."
   * Strategy:
     + Function: The function of the organism is to study the tracer methods of air movement in the mounds and nests of macrotermes michaelseni.
     + Mechanism: The mechanism of the organism is that it uses wind to power the nest ventilation, and the nests are ventilated by a tidal movement of air driven by temporal variation in wind speed and wind direction.
     + Context: The context of the organism is that it is a completely enclosed structure, and the density gradients are sufficiently steep to drive bulk flow by natural convection.
   * Notes:
     + WrongF
     + Function is incorrect.
     + Mechanism and Context are correct.
     + Key: It seems that with smaller abstracts, the function that is picked upis what the researchers do.
     + 2/3
9. W1589686983
   * Sample: "title": "A multi-enzyme cascade of hemoglobin proteolysis in the intestine of blood-feeding hookworms.", "abstract": "blood-feeding pathogens digest hemoglobin (hb) as a source of nutrition, but little is known about this process in multicellular parasites. the intestinal brush border membrane of the canine hookworm, ancylostoma caninum, contains aspartic proteases (apr-1), cysteine proteases (cp-2), and metalloproteases (mep-1), the first of which is known to digest hb. we now show that hb is degraded by a multi-enzyme, synergistic cascade of proteolysis. recombinant apr-1 and cp-2, but not mep-1, digested native hb and denatured globin. mep-1, however, did cleave globin fragments that had undergone prior digestion by apr-1 and cp-2. proteolytic cleavage sites within the hb \u03b1 and \u03b2 chains were determined for the three enzymes, identifying a total of 131 cleavage sites. by scanning synthetic combinatorial peptide libraries with each enzyme, we compared the preferred residues cleaved in the libraries with the known cleavage sites within hb. the semi-ordered pathway of hb digestion described here is surprisingly similar to that used by plasmodium to digest hb and provides a potential mechanism by which these hemoglobinases are efficacious vaccines in animal models of hookworm infection."
   * Strategy:
     + Function: The function of the organism is to digest hemoglobin as a source of nutrition.
     + Mechanism: The mechanism of the organism is that it uses aspartic proteases, cysteine proteases, and metalloproteases to break down hemoglobin into smaller fragments that can be used for nutrition.
     + Context: The context of the organism is that it is a blood-feeding hookworm.
   * Notes:
     + CorrectF
10. W2052657884
    * Sample: "title": "The Diversity of Hydrostatic Skeletons", "abstract": "a remarkably diverse group of organisms rely on a hydrostatic skeleton for support, movement, muscular antagonism and the amplification of the force and displacement of muscle contraction. in hydrostatic skeletons, force is transmitted not through rigid skeletal elements but instead by internal pressure. functioning of these systems depends on the fact that they are essentially constant in volume as they consist of relatively incompressible fluids and tissue. contraction of muscle and the resulting decrease in one of the dimensions thus results in an increase in another dimension. by actively (with muscle) or passively (with connective tissue) controlling the various dimensions, a wide array of deformations, movements and changes in stiffness can be created. an amazing range of animals and animal structures rely on this form of skeletal support, including anemones and other polyps, the extremely diverse wormlike invertebrates, the tube feet of echinoderms, mammalian and turtle penises, the feet of burrowing bivalves and snails, and the legs of spiders. in addition, there are structures such as the arms and tentacles of cephalopods, the tongue of mammals and the trunk of the elephant that also rely on hydrostatic skeletal support but lack the fluid-filled cavities that characterize this skeletal type. although we normally consider arthropods to rely on a rigid exoskeleton, a hydrostatic skeleton provides skeletal support immediately following molting and also during the larval stage for many insects. thus, the majority of animals on earth rely on hydrostatic skeletons."
    * Strategy:
      + Function: The function of a hydrostatic skeleton is to provide support, movement, and muscular antagonism.
      + Mechanism: The mechanism of a hydrostatic skeleton is that it uses internal pressure to transmit force.
      + Context: The context of a hydrostatic skeleton is that it is found in a wide array of animals and animal structures.
    * Notes:
      + CorrectF
11. 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."
    * Strategy:
      + Function: The pearly nautilus is trying to maintain neutral buoyancy.
      + Mechanism: The pearly nautilus does this by filling its shell with gas and water. The shell is impermeable to seawater, but the siphuncular tubes are very porous.
      + Context: The pearly nautilus is found in the ocean.
    * Notes:
      + CorrectF
12. W2005779387
    * 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."
    * Strategy:
      + Function: The function of the organism is to optimize or constrain development, resulting in a bounded plasticity that improves canopy performance.
      + Mechanism: The mechanism of the organism is that it quantifies intracanopy plasticity for 11 leaf traits across three canopy locations (basal-interior, basal-exterior, and top).
      + Context: The context of the organism is that it is arboretum-grown and the trees are of six temperate deciduous species averaging 13-18 m in height.
    * Notes:
      + WrongF
      + Good Summary:
        - Function: intracanopy plasticity in tree leaf form is a major determinant of whole-plant function and potentially of forest understory ecology.
        - Mechanism: optimize or constrain development, resulting in a bounded plasticity that improves canopy performance.
        - Context: leaf traits across three canopy locations (basal-interior, basal-exterior, and top)
13. 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."
    * Strategy:
      + Function: The function of the organism is to serve as a water storage function.
      + Mechanism: The mechanism of the organism is that it has a high water content (up to 79%), low wood density (0.09-0.17 g · cm(-3)), high parenchyma content (69-88%), and living cells beyond 35 cm into the xylem from the cambium.
      + Context: The context of the organism is that it is generally assumed to serve a water storage function, yet recent studies indicate limited use of stored water.
    * Notes:
      + WrongF
      + Right Summary
        - Function: stems of large trees serve in transport, storage, and support
        - Mechanism: large, water-filled stems
        - Context: baobab morphology and water storage capacity
14. 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."
    * Strategy:
      + Function: The function of the organism is to provide water repellency.
      + Mechanism: The mechanism of the organism is that it has a dense layer of overlapping, stellate or peltate trichomes that hold water off the leaf epidermis proper.
      + Context: The context of the organism is that it is a mesic terrestrial pitcairnioideae that either possesses glabrous leaf blades or hydrophobic layers of confluent trichomes on the abaxial surface.
    * Notes:
      + The abstract is a bit confusing because it is describing a new finding in the species, and that new finding has consequences in for that species.
      + But, it abstracts the information of the new finding perfectly, and this could be used for biomimicry cases, so I will count it as correct.
      + CorrectF
15. 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."
    * Strategy:
      + Function: The function of the organism is to take in water through the leaves.
      + Mechanism: The mechanism of the organism is that it takes in water through the leaves during the dry season when there is more precipitation.
      + Context: The context of the organism is in the tropical montane cloud forests and pre-montane cloud forests.
    * Notes:
      + Not Sure, it could be correct, but I think this is better
        - Function: improves plant water status during the dry season
        - Mechanism: cloud cover and leaf wetting
        - Context: during the dry season when there is more precipitation
16. W2024134236
    * Sample: "title": "Functional morphology of scale hinges used to transport water: convergent drinking adaptations in desert lizards (Moloch horridus and Phrynosoma cornutum)", "abstract": "the australian thorny devil, moloch horridus gray, 1841, and the texas horned lizard, phrynosoma cornutum harlan, 1825, have the remarkable ability to rapidly move water through interscalar spaces on their skin\u2019s surface to their mouth for drinking. the morphology of these scale hinges has not been studied. we used histological and sem techniques to examine and compare the scale hinges of both species. additional taxa in their respective lineages were examined in order to evaluate the potential that convergent evolution has occurred. in the two species that transport water, each scale hinge has a basally expanded and semi-enclosed channel formed by the hinge joint that is interconnected with all scale hinges on the body. we hypothesize that it is within this semi-tubular channel system of hinge joints, where the \u03b2-layer keratin of the integument is very thin, that water is transported. hinge joint walls are covered by a complex topography of fractured surfaces that greatly expand the channel\u2019s surface area and probably enhance capillary transport of water. in addition, we note differing morphology of scale surfaces at the rear of the jaws of both species. we hypothesize that capillary forces fill the scale-hinge system and additional forces, generated within the mouth by observed motions during drinking, depress local water-pressure to pull water through the channels of the hinge-joint system. we conclude that the combined features in the two species, semi-tubular hinge-joint channels with convoluted walls and a jaw-buccal cavity pumping-mechanism, have convergently evolved for capture, transport, and drinking of water from sporadic rainfall."
    * Strategy:
      + Function: The function of the organism is to transport water to its mouth for drinking.
      + Mechanism: The mechanism of the organism is that it has a system of interlocking channels between its scales that allow water to be transported to its mouth.
      + Context: The context of the organism is that it lives in a desert environment where water is scarce.
    * Notes:
      + CorrectF
17. W2075613570
    * Sample: "title": "Function of spiral grain in trees", "abstract": "through spiral grain, conduits for sap lead from each root to all branches. this uniform distribution of sap is indicated by the paths of vessels and tracheids, and has been proven experimentally by means of dyed sap injected into the base of stems or taken up by roots. trees receiving water only from roots at one side of the root collar nevertheless stay green and continue growing. spiral grain in bark distributes food from each branch to other flanks of the stem and to most roots. experimental interruptions of the sap and food conduits caused the cambial zone to reorient new conduit cells in new directions, bypassing the interruption. in particular, spiral grooves cut into the stem surface caused spiral grain. the new cells reorient through division and growth. although spiral grain is largely under genetic control, trees appear to have a spiral grain especially where needed for distribution of water when root spheres are dry at one side. compared with straight-grained trees, spiral-grained stems and branches bend and twist more when exposed to strong wind, in this way offering less wind resistance and being less likely to break. through the bending and twisting, snow slides down from branches rather than breaking them, but the main function of spiral grain is the uniform distribution of supplies from each root to all branches, and from each branch to many roots."
    * Strategy:
      + Function: The function of spiral grain in trees is to distribute water and food evenly throughout the tree.
      + Mechanism: The mechanism by which spiral grain in trees accomplishes this function is by reorienting new conduit cells in new directions, bypassing any interruptions in the sap or food conduits.
      + Context: The context in which spiral grain in trees performs this function is when the root spheres are dry at one side.
    * Notes:
      + Not Sure
      + GPT only abstracts 1 context, but the full context, I believe is something along the lines of “tree function”
18. W2071362227
    * Sample: "title": "Bacterial Recognition of Mineral Surfaces: Nanoscale Interactions Between Shewanella and \u03b1-FeOOH", "abstract": "force microscopy has been used to quantitatively measure the infinitesimal forces that characterize interactions between shewanella oneidensis (a dissimilatory metal-reducing bacterium) and goethite (alpha-feooh), both commonly found in earth near-surface environments. force measurements with subnanonewton resolution were made in real time with living cells under aerobic and anaerobic solutions as a function of the distance, in nanometers, between a cell and the mineral surface. energy values [in attojoules (10(-18) joules)] derived from these measurements show that the affinity between s. oneidensis and goethite rapidly increases by two to five times under anaerobic conditions in which electron transfer from bacterium to mineral is expected. specific signatures in the force curves suggest that a 150-kilodalton putative iron reductase is mobilized within the outer membrane of s. oneidensis and specifically interacts with the goethite surface to facilitate the electron transfer process."
    * Strategy:
      + Function: The function of S. oneidensis is to reduce metals.
      + Mechanism: The mechanism by which S. oneidensis does this is by interacting with a mineral surface, specifically goethite. This interaction facilitates electron transfer from the bacterium to the mineral.
      + Context: The context in which this function is performed is anaerobic conditions, in which electron transfer from bacterium to mineral is expected.
    * Notes:
      + CorrectF
19. W1994029841
    * Sample: "title": "Overcoming the brittleness of glass through bio-inspiration and micro-architecture", "abstract": "highly mineralized natural materials such as teeth or mollusk shells boast unusual combinations of stiffness, strength and toughness currently unmatched by engineering materials. while high mineral contents provide stiffness and hardness, these materials also contain weaker interfaces with intricate architectures, which can channel propagating cracks into toughening configurations. here we report the implementation of these features into glass, using a laser engraving technique. three-dimensional arrays of laser-generated microcracks can deflect and guide larger incoming cracks, following the concept of 'stamp holes'. jigsaw-like interfaces, infiltrated with polyurethane, furthermore channel cracks into interlocking configurations and pullout mechanisms, significantly enhancing energy dissipation and toughness. compared with standard glass, which has no microstructure and is brittle, our bio-inspired glass displays built-in mechanisms that make it more deformable and 200 times tougher. this bio-inspired approach, based on carefully architectured interfaces, provides a new pathway to toughening glasses, ceramics or other hard and brittle materials."
    * Strategy:
      + Function: The organism is trying to make glass more deformable and tough.
      + Mechanism: The organism uses a laser engraving technique to create microcracks that deflect and guide larger incoming cracks.
      + Context: The context is the process of making glass.
    * Notes:
      + This abstract is a bit confusing.
      + They speak about organisms with mineralized materials that are tough, ex: teeth. They also have weaker interfaces that make them “deformable”, by cracks for example.
      + The researchers try to create glass in such a way.
      + But, the actual mechanism is created by the researchers, not the organisms.
      + Therefore, I think this biological strategy is CorrectF
20. W2051302904
    * Sample: "title": "Extreme impact and cavitation forces of a biological hammer: strike forces of the peacock mantis shrimp Odontodactylus scyllarus.", "abstract": "summary - mantis shrimp are renowned for their unusual method of breaking shells with\nbrief, powerful strikes of their raptorial appendages. due to the extreme\nspeeds of these strikes underwater, cavitation occurs between their appendages\nand hard-shelled prey. here we examine the magnitude and relative contribution\nof the impact and cavitation forces generated by the peacock mantis shrimp\n odontodactylus scyllarus . we present the surprising finding that each\nstrike generates two brief, high-amplitude force peaks, typically\n390\u2013480 \u03bcs apart. based on high-speed imaging, force measurements and\nacoustic analyses, it is evident that the first force peak is caused by the\nlimb9s impact and the second force peak is due to the collapse of cavitation\nbubbles. peak limb impact forces range from 400 to 1501 n and peak cavitation\nforces reach 504 n. despite their small size, can\ngenerate impact forces thousands of times their body weight. furthermore, on\naverage, cavitation peak forces are 50% of the limb9s impact force, although\ncavitation forces may exceed the limb impact forces by up to 280%. the rapid\nsuccession of high peak forces used by mantis shrimp suggests that mantis\nshrimp use a potent combination of cavitation forces and extraordinarily high\nimpact forces to fracture shells. the stomatopod9s hammer is fundamentally\ndifferent from typical shell-crushing mechanisms such as fish jaws and lobster\nclaws, and may have played an important and as yet unexamined role in the\nevolution of shell form."
    * Strategy:
      + Function: The peacock mantis shrimp is trying to break shells with its raptorial appendages.
      + Mechanism: The peacock mantis shrimp creates cavitation bubbles that collapse and create a second force peak.
      + Context: The peacock mantis shrimp uses its mechanism to break shells in water.
    * Notes:
      + The Mechanism is not complete; there are 2 forces exerted by the mantis shrimp’s appendages.
      + WrongF, ⅔

* Conclusion
  + General
    - In total there are 11 correct generated outputs, 7 wrong, and 2 where I am not sure about if they are wrong or correct.
    - Out of the 7 wrong generated outputs, most are actually partially correct
      * W2103410568 (⅔)
        + context, function → correct
        + mechanism → incorrect.
      * W2151557512 (⅓)
        + The mechanism → correct
        + Function, context → incorrect

The context should be the function

The function abstracted is what the actual researchers are doing, not the organism

* + - * W2130285640 (1.5/3)
        + The function → correct.
        + The mechanism mixes up information found in the passage. But it is almost correct.
        + Furthermore, the context is a hallucination.
      * W1589686983 (⅔)
        + Mechanism, Context → correct.
        + Function → incorrect.

Key: It seems that with smaller abstracts, the function that is picked up is what the researchers do.

* + - * W2005779387 (0/3)
      * W2025490238 (0/3)
      * W2051302904 (⅔)
        + Function, Context → correct
        + Mechanism → incorrect

The Mechanism is not complete, but almost there.

|  | **Function** | **Mechanism** | **Context** | **~DocLength** |
| --- | --- | --- | --- | --- |
| W2103410568 | 1 | 0 | 1 | 205 |
| W2151557512 | 0 | 1 | 0 | 56 |
| W2130285640 | 1 | 0.5 | 0 | 254 |
| W1589686983 | 0 | 1 | 1 | 103 |
| W2005779387 | 0 | 0 | 0 | 259 |
| W2025490238 | 0 | 0 | 0 | 219 |
| W2051302904 | 1 | 0 | 1 | 235 |
| **Total:** | 3 | 2.5 | 3 |  |

* + Statistics (done in numpy)
    - Incorrect Samples
      * Max: 259
      * Min: 56
      * Mean: 190.14
      * Median: 219.0
      * Std dev: 73.16
      * Mode:
    - Correct Samples
      * Max: 273
      * Min: 126
      * Mean: 205.09
      * Median: 219.0
      * Std dev: 48.76
      * Mode: 219
  + The only conclusion I can make from the summary statistics is that, GPT does better when there is a larger number of words in the abstract and title.