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Energy anabolism as a modulator of adaptation across domains of life

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Adenosine 5'-trisphospate (ATP) is the universal currency of energy in living cells. We have determined that elevated ATP confers environmental stress resistance in disparate organisms. For example, glacier ice worms (Annelida) display atypically high ATP levels that paradoxically increase as temperatures decline, comparable with other cold-adapted taxa. By manipulating key targets in purine metabolism, we have generated strains of bacteria and algae with elevated ATP that are cold tolerant. The F1F0 ATP synthase complex is the primary producer of energy and is the most functionally conserved molecular machine across domains of life. We have identified two ice worm-specific accessory domains in subunits ATP6 and epsilon that likely enhance ATP production. We propose that manipulation of these targets will lead to translatable applications ranging from stress-resistant crops to the treatment of mitochondrial disease.

Biography

Daniel H Shain has completed his PhD from Colorado State University and Postdoctoral studies from the University of California, Berkeley. He has published more than 50 papers in reputed journals.

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