

# Logan's catalog of useful resources for creating the future

By Logan Thrasher Collins

I'm compiling this list to agglomerate just a few of the resources that I find useful for learning about how the world works, developing new skills, expanding my repertoire of ways of looking at global challenges, and planning how to contribute towards creating the future. Since many of the links here might change over time, please comment if you find any that do not work so that I can look for suitable replacement links. Also, feel free to let me know if you know of good resources not listed here! I'm always excited to expand my learning.

## **Scientific Funding**

[Bottlenecks of Aging](#) is a funding effort by the [Amaranth Foundation](#) which has selected a set of 12 limiting facets that have hindered progress towards extending the healthy human lifespan and is seeking proposals for projects which address these priorities.

[Convergent Research](#) is a group devoted to spinning off Focused Research Organizations (FROs). An FRO is typically awarded around \$30M to pursue a midsize research goal over the course of 5 years. FROs focus on goals that are too ambitious for academia but do not have a near-term commercial incentive that would make them work well as startup companies. Convergent Research was co-founded by [Adam Marblestone](#).

[Emergent Ventures Grant/Fellowship](#) is a program run by philanthropist Tyler Cowen which offers funding to applicants pursuing exciting projects. Anyone over the age of 13 can apply and the application process is straightforward. The Fellowship option additionally gives awardees the opportunity to receive mentorship through time in residence at the Mercatus Center in Northern Virginia.

[Funding Opportunities for Postdoctoral Scholars](#) is an excellent list compiled by Harvard University of competitive postdoctoral fellowships and similar funding opportunities.

[F99/K00 Transition to Aging Research for Predoctoral Students](#) is an NIH grant to which graduate students can apply in the last few years of their PhD training. It provides funding for the final 1-2 years of the PhD as well as for up to 4 years of postdoctoral research.

[NIH's grants homepage](#) is a website by the American National Institutes of Health which provides information about their grant programs.

[Speculative Technologies](#) is a nonprofit founded by [Benjamin Reinhardt](#) which funds "systems research" that does not fit easily into academia or industry. This means research that is necessary to create multiple interacting technologies that enable new capabilities to serve society. Unlike the FROs of Convergent Research, projects funded by Speculative Technologies are parallelized across multiple institutions and are not necessarily defined by a single approach to start.

[The Foresight Institute's AI Safety grant program](#) provides funding to project proposals that address certain underexplored areas of AI safety including whole-brain emulation and

neurotechnology, multipolar AI scenarios, and information security. It is sponsored by the [Foresight Institute](#).

[The Overedge Catalog](#) is a webpage listing a variety of non-traditional funding opportunities for science and technology research.

[Understanding science funding in tech](#) is a blog page by Nadia Asparouhova which discusses the history, approaches, and future of efforts to create new institutions for scientific funding which properly encourage innovation and circumvent the weight of bureaucracy present in existing federal funding sources.

[1517 Fund](#) is a nontraditional venture capital firm that backs “dropouts, renegade students & sci-fi scientists at the earliest stages of their companies”, particularly in deep tech fields. It features a variety of options for funding and reaching out to them to discuss specifics is encouraged.

### **Entrepreneurship and Organization Management**

[Erika’s quick-start guide to research nonprofits](#) is a blog page by Erika Alden DeBenedictis that gives information on how to raise funding from philanthropists, manage money, manage IP and spinouts, hire people, get lab space, and more.

[George M. Church’s Tech Transfer, Advisory Roles, and Funding Sources](#) is a list (with links) of the [Church laboratory’s](#) spectacular array of spinoff companies, investors, advisory roles, etc.

[How to Start a Life Science Company: A Comprehensive Guide for First-Time Entrepreneurs](#) is a concise book that covers lots of important points for life science entrepreneurship.

[List of Biotechnology Companies to Watch](#) is my own compilation of key biotechnology companies along with corresponding brief descriptions and notes.

[Notes on Starting a Scientific Organization](#) is a blog page by Sabrina Singh which provides information on how to start and manage new scientific organizations. It is particularly useful for learning about the bookkeeping and staffing aspects of management.

[So you want to start a biotech company](#) is an article published in Nature Biotechnology that goes over some key concepts important for entrepreneurship in the biosciences.

[Trailblazer List](#) is a website that describes numerous companies working in areas (e.g. neurotechnology, sustainability, computing, fabrication, and many more) that have the potential to radically impact the future for the better.

[Venture Capital for Bio 101](#) is a blog page by Celine Halioua which goes over the process of obtaining VC funding for biotechnology startups as well as some strategies to use and pitfalls to avoid.

### **History, Science, Society, and the Future**

[BigThink The Progress Issue](#) is a special issue of the science and society news website organization known as [BigThink](#) and its similar partner site [FreeThink](#). This issue is devoted to articles that use data to support rationally optimistic approaches to creating the future and that emphasize the importance of leveraging data-driven hope to overcome the predominant cultural zeitgeist of pessimism.

[Caspian Report](#) is an educational YouTube channel on geopolitics. In my opinion, it is a reputable source as YouTube channels go and presents information in a minimally biased fashion.

[Future of Humanity Institute](#) is a multidisciplinary research organization at the University of Oxford which combines philosophy, mathematics, and social science techniques to study existential risks, long-term future scenarios, and how humanity might best move forward. It was founded by Professor [Nick Bostrom](#) and employs [Toby Ord](#) (co-founder of the Effective Altruism movement) and Professor [Anders Sandberg](#) as senior researchers.

[Future of Life Institute](#) is a nonprofit organization with a mission of “steering transformative technology towards benefiting life and away from extreme large-scale risks”. It works through policy development and advocacy, education and outreach, research and grantmaking, institution building, and coordinating conferences. It focuses primarily on existential risks posed by artificial intelligence (esp. autonomous weapons), biotechnology, and nuclear weapons.

[Matt Bell](#) is a blog that has a number of excellent articles on science, futurism, and other topics. It has a particularly compelling post on [Embracing the Cosmic Endowment](#).

[Our World in Data](#) is a website that collects reputable data about the state of the world, organizes it into various categories, and provides useful ways of visualizing said data.

[Science X](#) is a consortium of science news websites including [Phys.org](#), [Medical Xpress](#), and [Tech Xplore](#). These sites post massive numbers of articles summarizing scientific papers and other types of advances in an accessible fashion.

[The Library of Existential Hope](#) is a website associated with the Foresight Institute which compiles resources on existential hope and existential risk management as well as on technology areas with the potential to shape the future.

### **Computing**

[Digital Fundamentals](#) is a textbook by Thomas Floyd that discusses the hardware architecture and mechanisms of digital computers. In my view, it has excellent visuals and explains concepts very clearly.

[HPCWire](#) is a news organization that writes articles about cutting-edge developments in the high-performance computing industry.

[Reducible](#) is a YouTube channel that uses animations and excellent teaching to explain concepts in computer science such as algorithms, image processing, and applied graph theory.

### **Synthetic Biology and Biotechnology**

[Addgene](#) is a company that distributes and sells plasmids (at reasonable prices) made by laboratories around the world. It represents a central repository for a wide variety of useful plasmids that can aid biotechnology research.

[Addgene's Viral Plasmids and Resources](#) page provides useful articles that describe the basics of lentivirus, adeno-associated virus (AAV), adenovirus, and  $\gamma$ -retrovirus as well as links to some other resources.

[AlphaFold Protein Structure Database](#) is a searchable catalog of predicted protein structures along with information about the accuracy of each prediction. Most known proteins are represented in the database. This catalog was created using the spectacularly successful AI protein prediction software [AlphaFold](#). Although not all of the predictions are perfect and many include high uncertainty within intrinsically disordered regions, the data most often agree strongly with experimental validations.

[GEN Genetic Engineering & Biotechnology News](#) is an excellent magazine that covers cutting-edge topics in the biotechnology industry. It is aimed at a scientific audience but might be somewhat accessible to others as well.

[GROMACS documentation](#) is an online manual describing how to use the GROMACS molecular dynamics simulation software package.

[J. Craig Venter Institute](#) is a nonprofit research organization that focuses on synthetic biology, building minimal cells, and developing genomics technologies. It is led by the National Medal of Science recipient [J. Craig Venter](#), one of the main contributors to the success of human genome sequencing.

[National Center for Biotechnology Information \(NCBI\)](#) is a collection of bioinformatics databases and tools sponsored by the NIH. The website hosts massive libraries of biological data such as [DNA sequences](#), [protein sequences](#), and [many more](#). It also includes [BLAST](#), a popular search tool that facilitates comparison of the evolutionary similarities among different biomolecular sequences.

[Oxman](#) is the website of a company founded by the transdisciplinary designer-biologist Professor [Neri Oxman](#) of the [MIT Media Lab](#). This website details some of the remarkable work by Neri Oxman and her team on devising ways of redesigning the built world to more seamlessly interact with the rest of the biosphere. They utilize architecture, design, art, philosophy, computer science, synthetic biology, and more to develop innovative new materials and systems.

[RCSB Protein Data Bank \(PDB\)](#) is a website that catalogs experimentally determined structures of proteins and protein complexes. It is user friendly and includes a wide range of features for analyzing its protein structures.

[SynBioBeta](#) is an “innovation network” for bioengineers, entrepreneurs, and investors in the synthetic biology industry, particularly within the area of sustainability. It hosts a yearly conference called [The Global Synthetic Biology Conference](#). In addition, its website includes an [industry news section](#) that posts synthetic biology news articles.

[Viral Vectors 101 Systemic Capsids](#) is an educational article on the [Addgene Blog](#) which provides a guide to the types of AAVs capable of traversing the blood-brain barrier.

[Want to learn biology? Recommended texts from beginner to advanced](#) is my own webpage which lists some of the textbooks I might recommend to teach oneself about the biological sciences from beginner to advanced levels.

### **Manufacturing**

[Bioprocess International](#) is an industry news website with articles that discuss biomanufacturing, biological purification methods, analytical techniques, and similar topics.

[Insights On Successful Gene Therapy Manufacturing And Commercialization](#) is a booklet compiled by industry experts on the logistical and technical challenges surrounding large-scale manufacturing of viral vectors for clinical gene therapy as well as on emerging solutions to these difficulties.

### **Neuroscience and Neurotechnology**

[Allen Brain Map](#) is a website hosting a treasure trove of many different neurobiology databases (such as the [cell types database](#)) developed through the multifaceted investigations of the [Allen Institute](#).

[BossDB](#) (Brain Observatory Storage Service & Database) is a publicly accessible data repository for storing and disseminating petabyte-scale neuroscience data, particularly from volume electron microscopy and x-ray microtomography.

[Complex brain networks: graph theoretical analysis of structural and functional systems](#) is a highly educational review journal article that covers the basics of applied graph theory and some ways it can be used in neuroscience.

[Expansion Microscopy: Super-Resolution Imaging with Hydrogels](#) is a review paper published in the journal Analytical Chemistry which discusses the methodologies of expansion microscopy (ExM), a powerful technique for imaging tissues. ExM works by infusing tissues with a swellable hydrogel to physically enlarge them in an isotropic fashion. This particular review paper was written by Sven Truckenbalt, one of the lead scientists at [E11 Bio](#).

[Global Highlights in Neurotechnology, Connectomics, and Brain Simulation: 2005 to 2019](#) is my own compilation of roughly one paragraph descriptions of scientific and organizational advances in forward-thinking neuroscience topics. At this point, it is somewhat outdated since it only covers advances up to 2019. Nonetheless, it is quite useful for reviewing the history and progress of these fields.

[Human Brain Project](#) is a large-scale European consortium that leverages a variety of computational and experimental approaches to better understand neuroscience. It grew out of Henry Markram's [Blue Brain Project](#) at EPFL which focuses more on computational neuroscience.

[McGovern Institute](#) is an institute at MIT which focuses on neuroscience and neurotechnology. Some of the world's top researchers such as [Ed Boyden](#) and [Feng Zhang](#) lead research groups as part of this institute.

[Neuroglancer web viewer for Drosophila connectome](#) is an interface that uses the [Neuroglancer](#) software to facilitate visualization of the segmented electron microscopy volume that comprises the connectome of the *Drosophila* fly brain.

[NIH BRAIN Initiative](#) (Brain Research Through Advancing Innovative Neurotechnologies) is an American governmental program that funds efforts towards more comprehensive understanding of neuroscience.

## **AI Safety**

[Fact Sheet President Biden Issues Executive Order on Safe, Secure, and Trustworthy Artificial Intelligence](#) is an informational document issued by the U.S. government on an Executive Order aimed at mitigating risks from AI.

[Preventing antisocial robots: A pathway to artificial empathy](#) is a viewpoint journal article published in Science Robotics which proposes ways of encoding affective empathy (not just cognitive empathy) into AI to prevent machines from acting as sociopaths.

[Superintelligence: Paths, Dangers, Strategies](#) is a seminal 2005 book by [Nick Bostrom](#) which discusses the existential risks posed by potential artificial superintelligence and how we might mitigate these risks.

[The Singularity Is Near: When Humans Transcend Biology](#) is a foundational text in futurism that proposes arguments that humanity is on the brink of a tipping point called the Singularity where accelerating technological progress might drive profound changes in the human condition. It focuses on artificial intelligence in particular as a major force behind potential dramatic changes to our world (and even universe) in the coming decades. Though this text is thought by many to make some rather unlikely claims, it presents valuable ideas to contemplate even if some of them seem outlandish.

### **Longevity**

[Hallmarks of aging: An expanding universe](#) is a review paper that provides an excellent overview of the biology of aging and efforts to treat the condition. This paper represents a 2023 update based on a seminal 2013 review titled [The Hallmarks of Aging](#).

[Human Ageing Genomic Resources](#) is a website that collects searchable databases of aging-related genes, drug data, variants, and more. It aids and facilitates quantitative research on aging topics.

[Nature Aging](#) is a top scientific journal that publishes scientific papers across the aging research fields.

[Oviva](#) is a startup company developing therapeutics to improve ovarian function, prevent menopause, and extend healthspan in women. Co-founded by [Daisy Robinton](#), Oviva aims to bring women's health into the longevity conversation.

[Protective and Enhancing Alleles](#) is a list of known human alleles compiled by George Church's lab that are known to contribute to various abilities such as disease resistance, longevity, strength, intelligence, etc.

[Want to live to 150? The world needs more humans](#) is an editorial originally published in the Washington Post which details compelling ethical arguments in favor of healthspan extension. Though paywalled at the Washington Post, it is available for free from the author [Raiany Romanni](#) at her website.

### **Mathematics**

[Quanta Magazine](#) is an online magazine that publishes educational articles on topics in mathematics, computer science, physics, and biology. These articles are written in an accessible style yet emphasize rigorous mathematical approaches to questions.

[3Blue1Brown](#) is an educational YouTube channel that covers advanced mathematics in an accessible way by using beautiful animations and top-notch teaching to illustrate



precise quantitative concepts which might otherwise be much more challenging to understand (e.g. [10-dimensional sphere packing](#), the [math behind deep learning](#), etc.)

[Understanding Topology: A Practical Introduction](#) is a remarkably accessible textbook on topology. It provides the clearest explanations (in my view) out of all of the many topology books I've examined.

## **Philosophy**

[Contemporary Futurist Thought: Science Fiction, Future Studies, and Theories and Visions of the Future in the Last Century](#) is a scholarly book which explores science fiction and future studies.

[Hedonistic Imperative](#) is a book-length online manifesto by the philosopher [David Pearce](#) which makes philosophical arguments in favor of abolishing all suffering by using future biotechnology. He further argues for radically enhancing positive emotions while retaining motivation through "gradients of bliss". Within his manifesto, Pearce makes a compelling case for sustainably [eliminating suffering in wild animals](#).

[Stanford Encyclopedia of Philosophy](#) and the [Internet Encyclopedia of Philosophy](#) both consist of high-quality scholarly educational articles that explain a wide range of philosophical concepts in depth.

## **Physics**

[Here's How to Teach Yourself Physics and Math](#) is a webpage on Futurism.com that links to several different lists of textbooks which one can use to learn physics and mathematics from beginner to advanced levels.

[Notes on Classical Mechanics](#) is my own webpage with explanations of Lagrangian and Hamiltonian mechanics as well as linear oscillations and coupled linear oscillators.

[Notes on Optics and Microscopy](#) is my own webpage with some explanations of optical physics and its applications in microscopy.

## **Earth and Space**

[\[C\]Worthy](#) is a seed-stage [Focused Research Organization](#) that develops methodologies for monitoring, reporting, and verifying the effects of marine carbon dioxide removal technologies. They are building software for multiscale oceanographic modeling and data integration that will quantify the efficacy and the ecological impacts of marine carbon dioxide removal. They aim to provide the validation framework necessary as part of efforts to enable gigaton-scale carbon dioxide removal by 2050.

[SpaceBorn United](#) is an organization engaged in research on ways of enabling human reproduction in outer space. They have developed a prototype "space embryo incubator"



and have a roadmap of space mission plans to facilitate their research on developmental biology in space. They have engaged broad expertise and partners to help address technical, medical, regulatory/legal, and ethical challenges associated with their goals.