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Columbia University - Morningside Heights Biological Sciences

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Evolutionary processes shaping genome evolution and adaptations

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Cell biology of the neuron

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Function of the cytoskeleton during the cell cycle and differentiation

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Developmental genetics of identified nerve cells in *C. elegans*

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Pre-mRNA splicing; molecular and computational approaches

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Bacterial models for biological shape and pattern formation

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Regulation of innate behavior in blood-feeding arthropods

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Single molecule mechanics and engineering

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Cellular mechanisms and signal transduction of olfaction

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Create and apply multi-omic technologies to study biomolecular and cellular interactions

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Vulva development in *C. elegans*

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Epigenetic regulation of gene expression in *Drosophila*

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Genetic programs that control neural development in *C. elegans*

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Structural biology of transmembrane transport

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Epigenetic regulation of the genome

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Regulation of Protein Production Dynamics: RNA Binding Proteins and the Ribosome Code

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Hedgehog signaling in *Drosophila* development

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Neurobiology of vocal communication and sexual differentiation

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mRNA transcription, splicing, and processing

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The function and organization of molecular networks

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Growth factor regulation of gene expression

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Molecular Biophysical analysis of single molecule interactions

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Diagramming disease networks with chemical and biological tools

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Statistics: stochastic computation, approximate Bayesian computation, data science, computational biology, statistical bioinformatics

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Principles of cellular adaptation

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Molecular, optical and data analytic methods for multi-scale understanding of complex biological systems

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Protein structure of enzymes involved in fatty acid metabolism

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Evolution of cell types and circuits in the vertebrate brain

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Mitochondrial biogenesis

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Structure, function and regulation of ion channels

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Function of the cortical microcircuit

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Ribosome biochemistry

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Ribosomal protein synthesis

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Cancer cell invasion in novel biopolymer gels

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NMR studies of enzyme mechanism and membrane protein structure

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Imaging of lipid storage and metabolism in *C. elegans*

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Computational methods in human genetics

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Neural basis and behavior of social communication

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Genetic programs of axial tissue development

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How honey bees fight off microbes?

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Cryo-electron microscopy and 3D reconstruction of protein biosynthesis

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Retrovirus replication; tyrosine kinases & signal transduction

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Transcription termination in *E. coli* and bacteriophage

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DNA recombination and repair

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Short RNAs regulation of chromatin and gene expression in *C. elegans*

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RNA-mediated epigenetics and genome reorganization during development

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Homeotic gene function and their downstream targets in *Drosophila*

Genetics & Development

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The effect of "DNA methylation in sex cells"

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Genetics of mouse kidney development

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Cell cycle control and growth during development

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Intestinal stem cells in *Drosophila*

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Yeast genetics and cellular responses to DNA damage in cancer

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The circadian clock's regulation of immune function in *Drosophila*

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Drosophila developmental genetics

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Mouse pancreatic islet differentiation and development

Medicine

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Pathogenesis of vasodilatory shock

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Inflammation and immune response

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Cytokine signal transduction and its role in the immune response

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Olfaction

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Neuronal networks in the rodent whisker-barrel system

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Molecular mechanisms underlying learning and memory

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Neuron and glial cell fate determination

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Modeling of brain circuitry, and development

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Mechanisms in neurodegeneration

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Calcium signal in response to NMDA receptor activation in a dopamine neuron axonal growth cone.

Otolaryngology

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Head & neck carcinoma and pancreatic ductal adenocarcinoma

Pathology & Cell Biology

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Neurodegeneration and the life cycle of dopamine neurons

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fundamental issues in the biology of the mammalian blood-brain barrier (BBB)

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Molecular regulation and mechanics of cell division

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Glioma cell migration and proliferation

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Molecular mechanisms in Alzheimer's disease

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The role of stem cells and Shh in the adrenal cortex

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Cell cycle, division and chromosome movement

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Axon guidance and synaptogenesis

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Molecular control of the development of the urogenital system

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Preclinical therapeutics in genetically engineered mouse models of pancreatic cancer

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Role of the actin cytoskeleton

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Biomarker discovery and gene expression profiling

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Role of cytoskeleton, cell cycle machinery, and proteases in neuronal degeneration

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Glycoproteins and glycolipids

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Molecular mechanisms of neuronal death

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Retinal degeneration

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DNA break repair

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Ion channel structure and function

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Computational modeling of neural systems and visual psychophysics

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Neural basis of selective attention and visually guided behavior

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Molecular events underlying Na⁺-coupled transport

New York State Psychiatric Institute

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Neuro-circuitry of psychiatric disease

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Genetic dissection of complex signaling pathways in schizophrenia

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Learned fear and the neuropathology of schizophrenia