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Marmoset hippocampal perineuronal net loss causes schizophrenia-like changes in striatal and orbitofrontal function.

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BY LI CHEN, XIN ZOU, CUI-CUI LIU, PU YAN, JIE DENG, CHEN WANG, MU-YANG CHEN, XIAO-QING TANG, JING-MING SHI, WEN-JUN XIN, [...] JING-DUN XIE +3 authors • 16 APR 2025

Sex-related ICAM-1 drives early female PTX-induced neuropathic pain via perivascular macrophage–astrocyte-neuron signaling.

ABSTRACT

Food sensing controls *C. elegans* reproductive behavior by neuromodulatory disinhibition

BY YEN-CHIH CHEN, KARA E. ZANG, HASSAN AHAMED, NIELS RINGSTAD • 16 APR 2025

C. elegans reproductive behavior is governed by neuromodulators that couple food-sensing neurons to the egg-laying system.

ABSTRACT

EARTH, ENVIRONMENTAL, ECOLOGICAL, AND SPACE SCIENCES

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BY SIMONA MEILER, CHAHAN M. KROPF, JAMIE W. MCCAUGHEY, CHIA-YING LEE, SUZANA J. CAMARGO, ADAM H. SOBEL, NADIA BLOEMENDAAL, KERRY EMANUEL, DAVID N. BRESCH • 18 APR 2025

Quantifying, classifying, and comparing uncertainties in future tropical cyclone risks toward actionable climate decisions.

ABSTRACT

Wandering of the auroral oval 41,000 years ago

BY AGNIT MUKHOPADHYAY, SANJA PANOVSKA, RAVEN GARVEY, MICHAEL W. LIEMOHN, NATALIA GANJUSHKINA, AUSTIN BRENNER, ILYA USOSKIN, MIKHAIL BALIKHIN, DANIEL T. WELLING • 16 APR 2025

Earth's magnetic field weakened severely 41,000 years ago, shrinking the space environment and causing the aurora to wander.

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Eight centuries of Bermuda high patterns show a 50% increase in western flank variability starting in 1900 CE.

ABSTRACT

Discovery of a high-velocity cloud of the Milky Way as a potential dark galaxy

BY XIAO-LAN LIU, JIN-LONG XU, PENG JIANG, MING ZHU, CHUAN-PENG ZHANG, NAIPING YU, YE XU, XIN GUAN, JUN-JIE WANG • 18 APR 2025

The origins of the HVCs remain poorly known due to the difficulty in determining their distance.

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Pyrite stimulates the growth and sulfur oxidation capacity of anoxygenic phototrophic sulfur bacteria in euxinic environments

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Anoxygenic phototrophic sulfur bacteria acquire iron from pyrite under iron-depleted conditions via oxidizing pyritic sulfur.

ABSTRACT

PHYSICAL AND MATERIALS SCIENCES

Optical coherent quantum control of ultrafast protein electron transfer

BY YIFEI ZHANG, NA LIU, KANGWEI NIU, XI WANG, JIE YANG, FAMING LU, JIE CHEN, DONGPING ZHONG • 16 APR 2025

Ultrafast protein electron transfer is optically controlled by quantum coherence of molecular wave packet with chirped excitation.

ABSTRACT

Broadband localization of light at the termination of a topological photonic waveguide

BY DANIEL MUIS, YANDONG LI, RENÉ BARCZYK, SONAKSHI ARORA, L. KUIPERS, GENNADY SHVETS, EWOLD VERHAGEN • 18 APR 2025

Light is observed to localize and enhance at the termination of a topological photonic waveguide due to suppressed backscattering.

ABSTRACT

In vivo and in situ monitoring of doxorubicin pharmacokinetics with an implantable bioresorbable optical sensor

BY MARTINA CORSI, ELENA MAURINA, SALVATORE SURDO, ELEONORA VANDINI, ELEONORA DAINI, ANTONIETTA VILELLA, GIUSEPPINA LEO, MOEIN FARSHCHIAN, GIULIA ORSENIGO, GIULIA GOLINELLI, [...] GIUSEPPE BARILLARO +3 authors • 16 APR 2025

A thin, bioresorbable sensor enables real-time wireless tracking of doxorubicin in tissue with high spatiotemporal precision.

ABSTRACT

Statistical analysis of fluorescence intensity transients with Bayesian methods

BY HAMED KARIMI, MARTIN LAASMAA, MARGUS PIHLAK, MARKO VENDELIN • 18 APR 2025

Advanced statistical techniques reduce laser damage and improve efficiency in single-molecule fluorescence analysis.

ABSTRACT

Topology optimization of random memristors for input-aware dynamic SNN

BY BO WANG, XINYUAN ZHANG, SHAOCONG WANG, NING LIN, YI LI, YIFEI YU, YUE ZHANG, JICHANG YANG, XIAOSHAN WU, YANGU HE, [...] DASHAN SHANG +7 authors • 18 APR 2025

PRIME optimizes memristive SNNs with pruning and input-aware early stop, enhancing energy efficiency for neuromorphic hardware.

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An electric field–confined strategy for preparing 3D atomic TiO_xC_y membrane with high electrocatalytic efficiency is developed.

ABSTRACT

In vivo dynamics of indole- and phenol-derived plant hormones: Long-term, continuous, and minimally invasive phytohormone sensor

BY ABDULLAH H. ALSHAWAFI, SAPTAMI S. SHETTY, ESRAA FAHED, MARIO SOTO MARTINEZ, CECILIA LERMA, MUFEEDA MUNDUMMAL, JUAN YOU WANG, JÜRGEN KOSEL, SALIM AL-BABILI, IKRAM BLILOU, KHALED N. SALAMA • 18 APR 2025

Leveraging cyclical amperometric cleaning enables the simultaneous in vivo sensing of electroactive plant hormones.

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Deriving mobility-lifetime products in halide perovskite films from spectrally and time-resolved photoluminescence

BY YE YUAN, GENGHUA YAN, SAMAH AKEL, UWE RAU, THOMAS KIRCHARTZ • 16 APR 2025

Determine the out-of-plane diffusion length in perovskite thin films with transient photoluminescence.

ABSTRACT

A wireless, self-powered smart insole for gait monitoring and recognition via nonlinear synergistic pressure sensing

BY QI WANG, HUI GUAN, CHEN WANG, PEIMING LEI, HONGHEI SHENG, HUASHENG BI, JINXUN HU, CHENHUI GUO, YUCHUAN MAO, JIAO YUAN, [...] WEI LAN +3 authors • 16 APR 2025

A wireless, self-powered smart insole enables gait monitoring and recognition with nonlinear synergistic pressure sensing.

ABSTRACT

Single-site ruthenium catalyst supported on zeolite for CO_2 hydrogenation to methyl formate

BY ROLAND C. TURNELL-RITSON, LINDSEY E. K. FREDERICKS, JAN-ROMANO SEGIA, BARBARA DOMMEN, SARLÈNE S. DRESSEL, ELIO ANTONUCCI, XUNHUI WANG, VICTOR BUSKIAL, RICHARD Y. KONG, KYLE M. LANCASTER, PAUL J. DYSON • 16 APR 2025

A robust, single-site supported Ru complex catalyzes methanol hydrocarboxylation, with excellent selectivity for methyl formate.

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Cocrystals combining order and correlated disorder via colloidal crystal engineering with DNA

BY YUANWEI LI, MINJIE ZHOU, YUAN ZHOU, HO FUNG CHENG, BYEONGDU LEE, XIAOBING HU, ERIC W. ROTH, VINAYAK P. DRAVID, SHARON C. GLOTZER, CHAD A. MIRKIN • 16 APR 2025

Cocrystals with programmable order and correlated disorder enable exotic multicomponent materials via DNA-guided assembly.

ABSTRACT

Oscillating microbubble array–based metamaterials (OMAMs) for rapid isolation of high-purity exosomes

BY ANLAN LI, ZHITING DENG, WENJUN ZHANG, WEI ZHOU, XIAFANG LIU, HAO QUAN, JIALI LI, PENGDI LI, YINGYIN LI, CAI HU, [...] HAIRONG ZHENG +4 authors • 16 APR 2025

Oscillating microbubble array–based metamaterials enable rapid isolation of high-purity exosomes.

ABSTRACT

Multiscale graph equivariant diffusion model for 3D molecule design

BY LEI CHEN, YAN LI, YANJIE MA, LIN GAO, LIANG YU • 16 APR 2025

A diffusion model, MD3MD, generates diverse, stable, and innovative 3D molecules by leveraging multiscale graph representations.

ABSTRACT

BIOMEDICINE AND LIFE SCIENCES

Nuclear accumulation of YTHDF1 regulates mRNA splicing in the DNA damage response

BY JINHYEI KWON, YUNYI GAO, BINGHAN, SILIAN YANG, SASHA WEI, XIAOHONG XIE • 16 APR 2025

In response to x-ray irradiation, YTHDF1 accumulates in the nucleus to regulate the splicing and expression of DNA repair genes.

ABSTRACT

Targeting PGM3 abolishes SREBP-1 activation-hexosamine synthesis feedback regulation to effectively suppress brain tumor growth

BY HUALI SU, YAOQIANG ZHONG, LIQING HE, FENG DENG, XIMMIN YIN, YONGQIN LUO, WENG CHANG, XIAOXU MIAO, YUNZHOU FAN, YANXIU LIU, [...] DELIANG GUO +7 authors • 16 APR 2025

Hexosamine synthesis pathway and SCAP/SREBP-1 reciprocally enhance each other to drive malignant brain tumor growth.

ABSTRACT

Aggregation of α-synuclein splice isoforms through a phase separation pathway

BY ALEXANDER RÖNTGEN, ZENON TOPRAKCIOGLU, SAMUEL T. DADA, OWEN M. MORRIS, TUOMAS P. J. KNOWLES, MICHELE VENDRUSCOLO • 16 APR 2025

A study reveals that splice isoforms of α-synuclein can alter the condensation pathway of this protein.

ABSTRACT

Permissive central tolerance plus defective peripheral checkpoints license pathogenic memory B cells in CASPR2-antibody encephalitis

BY BO SUN, DOMINIQUE FERNANDES, JOHN SOLTYS, ANNE-KATHRIN KIENZLER, SOFIJA PANEVA, RUBY HARRISON, SUDARSHINI RAMANATHAN, ANNA L. HARRISON, MATEUSZ MAKUCH, MIRIAM L. FICHTNER, [...] SAROSH R. IRANI +31 authors • 16 APR 2025

Central and peripheral tolerance thresholds that license CASPR2-antibody diseases are identified.

ABSTRACT

Dietary methionine restriction started late in life promotes healthy aging in a sex-specific manner

BY ULALUME HERNANDEZ-ARCIGA, CEDA STAMENKOVIC, SHREYA YADAV, CHIARA NICOLETTI, WAFAA N. ALBALAWI, FARAZDAQ AL HAMMADI, TIFFANY FUENTES, GONZALEZ, MAITREYI U. NAKHARI, ADAM ORAHAM, CHRISTIAN BAMEZ, [...] ANDREY A. PARKHITKO +33 authors • 16 APR 2025

Late-life methionine restriction extends healthspan in aged mice, revealing a promising target for antiaging therapies in humans.

ABSTRACT

Metabolic rewiring caused by mitochondrial dysfunction promotes mTORC1-dependent skeletal aging

BY CHRISTINA BUBB, LYDIA HOFFMANN, CHRISTIANA PROBST, TARKY PRASHAR, MAXIMILIAN SCHUETTER, FREDERIK DETHLOFF, SUSANNA REINCKE, JANICA L. NOLTE, MARCUS KRÜGER, URSULA SCHLÖTZER-SCHREHARDT, [...] BENT BRACHVOGEL +4 authors • 18 APR 2025

Dysfunctional mitochondria reverse the TCA cycle to stimulate a profound skeletal aging response.

ABSTRACT

A palette of bright and photostable monomeric fluorescent proteins for bacterial time-lapse imaging

BY NATHAN FRAIKIN, AGATHE COUTURIER, ROMAIN MERCIER, CHRISTIAN LESTERLIN • 16 APR 2025

Bright and photostable monomeric fluorescent proteins enable long-term time-lapse imaging in *E. coli*.

ABSTRACT

Cathelicidin antimicrobial peptides mediate immune protection in marsupial neonates

BY JONGBEOM PARK, WENHAN KE, AELLAH KAAGE, CHARLES Y. FEIGIN, AMON H. GRIFFING, YURI PRITYKIN, MOHAMED S. DONIA, RICARDO MALLARINO • 18 APR 2025

Cathelicidin antimicrobial peptides protect marsupial neonates by mediating immune defense against pathogens.

ABSTRACT

Spatial analysis of mitochondrial gene expression reveals dynamic translation hubs and remodeling in stress

BY ADAM BEGEMAN, JOHN A. SMOLKA, AHMAD SHAMI, TANESHE PRADIP WANGIKAR, SAMANTHA C. LEWIS • 18 APR 2025

Quantitative imaging of the mitochondrial central dogma identifies translation hubs that are suppressed during stress.

ABSTRACT

Live-cell quantification reveals viscoelastic regulation of synapsin condensates by α-synuclein

BY HUAN WANG, CHRISTIAN HOFFMANN, JOHANNES V. TROMM, XIAO SU, JORDAN ELLIOTT, HAN WANG, MENGYING DENG, CONOR MCCLENAGHAN, JEAN BAUM, ZHIPING P. PANG, [...] ZHENG SHI +1 authors • 16 APR 2025

Direct material quantifications reveal a liquid-to-solid transition of synapsin condensates in vitro and in live cells.

ABSTRACT

A genetic variant in *SMAD7* acts as a modifier of *LMNA*-associated muscular dystrophy, implicating SMAD signaling as a therapeutic target

BY NATHANIEL P. MOHAR, CHRISTOPHER J. LANGLAND, ZACHARY DARR, JILL VILES, STEVEN A. MOORE, BENJAMIN W. DARBRO, LORI L. WALLRATH • 18 APR 2025

Genetic variation in *SMAD7* is associated with severe *LMNA*-MD by enhancement of SMAD signaling, offering therapeutic options.

ABSTRACT

A conserved opal termination codon optimizes a temperature-dependent trade-off between protein production and processing in alphaviruses

BY TAMANASH BHATTACHARYA, EVA M. ALLEMAN, TIA S. FREEMAN, ALEXANDER C. NOYOLA, MICHAEL EMERMAN, HARMIT S. MALIK • 18 APR 2025

Alphaviruses optimize viral polymerase production and polyprotein processing at distinct temperatures via a premature stop codon.

ABSTRACT

The ectodomain sheddase ADAM10 restricts HIV-1 propagation and is counteracted by Nef

BY BALAJI OLETY, YOSHIKO USAMI, PAUL PETERS, YUANFEI WU, HEINRICH GÖTTLINGER • 18 APR 2025

The HIV-1 Nef protein protects virus particles from partial inactivation by the cellular protease ADAM10.

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Reciprocal phosphorylation between SOAK1 and SOBIR1 fine-tunes receptor-like protein (RLP)–mediated plant immunity

BY YONGMING CHEN, YINGYING SONG, ZHIPENG TU, WEISHUAI BI, CONGCONG SUN, TINGTING ZHAO, XIAODAN WANG, DAOLONG DOU, GUANGYUAN XU • 18 APR 2025

SOAK1-SOBIR1 module fine-tunes receptor-like protein (RLP)–mediated plant immunity.

ABSTRACT

Hydrogen-induced disruption of the airway mucus barrier enhances nebulized RNA delivery to reverse pulmonary fibrosis

BY CHANG LIU, XIDONG TIAN, ZHENPING WANG, JUDITH CHOI WO MAK, SHIRUI MAO, TZU-MING LIU, YING ZHENG • 16 APR 2025

Inhalation of therapeutic hydrogen, in conjunction with nebulized RNA therapy, holds the potential to reverse pulmonary fibrosis.

ABSTRACT

Deubiquitinase USP24 activated by IL-6/STAT3 enhances PD-1 protein stability and suppresses T cell antitumor response

BY HUNG-CHIA HSIEH, MING-JER YOUNG, KUAN-YU CHEN, WU-CHOU SU, CHIEN-CHUNG LIN, YI-TING YEN, JAN-JONG HUNG, YI-CHING WANG • 16 APR 2025

Cytokine IL-6 drives STAT3/NF-κB signaling to increase USP24 expression, which promotes PD-1 deubiquitination and stabilization.

ABSTRACT

Sustained mTORC1 activation in activated T cells impairs vaccine responses in older individuals

BY XIAORONG LIN, YANHUA DU, SHUO KAN, JUNJIE CHEN, YUNXUE YIN, LINLIN LI, JINDREN CHEN, WENRONG JIANG, WENQIANG CAO, CHULWOO KIM, [...] JUN JIN +3 authors • 18 APR 2025

The leucine transporter SLC7A5 sustains mTORC1 activity and impairs TFH maintenance in older individuals.

ABSTRACT

Progesterone signaling in oviductal epithelial cells modulates the immune response to support preimplantation embryonic development

BY EMILY A. MCGLADE, JIUDE MAO, KALLI K. STEPHENS, RYAN M. MARQUARDT, FEYZA NUR ARGUC, PETER F. LAIS, SAN-PIN WU, SARAYUT WINUTHAYANON, HAVAL SHIRWAN, ESMA S. YOLCU, [...] WIPAWEE WINUTHAYANON +4 authors • 18 APR 2025

Progesterone signaling regulates the immune response, aiding preimplantation embryonic development in the mouse oviduct.

ABSTRACT

Engineering bacteriophages through deep mining of metagenomic motifs

BY PHIL HUSS, KRISTOPHER KIEFT, ANTHONY MEGER, KYLE NISHIKAWA, KARTHIK ANANTHARAMAN, SRIVATSAN RAMAN • 18 APR 2025

We unlock the potential encoded in phage metagenomes to engineer phages to change host range and kill pathogenic bacteria.

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The mass of red cells circulating in the blood has a direct effect on blood glucose.

ABSTRACT

A METTL3-NFE2L3 axis mediates tumor stemness and progression in lung adenocarcinoma

BY YUE ZHAO, LEI ZHANG, LANG XIA, HAORAN E, TAO WANG, HUNAN LU, HEZHONG CHEN, YUNLIANG SHE, HAO TANG, JUNQI WU, [...] CHANG CHEN +1 authors • 16 APR 2025

Targeting METTL3 in lung adenocarcinoma may enhance immune-based neoadjuvant therapies by reversing cancer stem cell properties.

ABSTRACT

Persistent IgG1 clones dominate and personalize the plasma antibody repertoire

BY DANIQUE M. H. VAN RIJSWIJCK, ALBERT BONDT, DINA RAAFAT, SILVA HOLTFRETER, KILIAN A. WIETSCHEL, SJORS P. A. VAN DER LANS, UWE VÖLKER, BARBARA M. BRÖKER, ALBERT J. R. HECK • 16 APR 2025

Abundant IgG1 clones in blood persist for at least a year, likely originating from long-lived plasma cells.

ABSTRACT

Kinetic implications of IP_6 anion binding on the molecular switch of HIV-1 capsid assembly

BY MANISH GUPTA, ARPA HUDAIT, MARK YEAGER, GREGORY A. VOTH • 16 APR 2025

Atomistic simulations reveal IP6 allosterically regulates the TVGG coil-to-helix transition, promoting HIV-1 pentamer assembly.

ABSTRACT

Critical roles of chronic BCR signaling in the differentiation of anergic B cells into age-associated B cells in aging and autoimmunity

BY KEISUKE IMABAYASHI, YUTARO YADA, KAZUHIKO KAWATA, MOTOKI YOSHIMURA, TAKESHI INAGAKI, AKEMI BABA, AKIHITO HARADA, KOICHI AKASHI, HIROAKI NIIRO, YOSHIHIRO BABA • 18 APR 2025

Constitutive active BCR signaling is essential for the generation and maintenance of age-associated B cells from anergic B cells.

ABSTRACT

Mechanism of DNA replication fork breakage and PARP1 hyperactivation during replication catastrophe

BY PEDRO ORTEGA, ELODIE BOURNIQUE, JUNYI LI, AMBROCIO SANCHEZ, GISSELLE SANTIAGO, BROOKE R. HARRIS, JOSEFINE STRIEPEN, JOHN MACIEJOWSKI, ABBY M. GREEN, REMI BUISSON • 16 APR 2025

Upon ATR inhibition, APOBEC3B targets unprotected single-stranded DNA at replication forks, leading to fork breakage.

ABSTRACT

Dihydroxyacetone phosphate generated in the chloroplast mediates the activation of TOR by CO_2 and light

BY MANUEL J. MALLÉN-PONCE, ANDREA M. QUINTERO-MORENO, SAMUEL GÁMEZ-ARCAS, ARTHUR R. GROSSMAN, MARÍA ESTHER PÉREZ-PÉREZ, JOSÉ L. CRESPO • 18 APR 2025

Light and CO_2 activate the eukaryotic TOR kinase through the central metabolite dihydroxyacetone phosphate.

ABSTRACT

Ara-C suppresses H3 K27–altered spinal cord diffuse midline glioma growth and enhances immune checkpoint blockade sensitivity

BY BO PANG, YILIN WU, SONGYUAN AN, YUZHOU CHANG, HAO YAN, HAN LIN, ZHENG ZHAO, FAN WU, QING CHANG, WENQING JIA, [...] RUICHAO CHAI +2 authors • 16 APR 2025

Ara-C combats aggressive spinal cord tumors by triggering apoptosis and boosting immune checkpoint blockade efficacy.

ABSTRACT

A germline *ETV6* mutation disrupts hematopoiesis via de novo creation of a nuclear export signal

BY MICHAEL MCCONVILLE, TOBY THOMAS, RYAN BECKNER, BENJAMIN KROGER, CATHERINE VALADEZ, YUH MIN CHOOK, STEPHEN CHUNG, OLEN LISZCZAK • 16 APR 2025

The ETV6 P214L mutation creates an XPO1-dependent nuclear export signal, driving protein mislocalization and hematologic disease.

ABSTRACT

Isoprene deters insect herbivory by priming plant hormone responses

BY ABIRA SAHU, MOHAMMAD GOLAM MOSTOFA, YUAN XU, BIANCA M. SERDA, JAMES O'KEEFE, THOMAS D. SHARKEY • 18 APR 2025

Isoprene, emitted from plants to the atmosphere in large amounts, repels insect herbivory by increasing jasmonic acid in plants.

ABSTRACT

Proteorhodopsin insights into the molecular mechanism of vectorial proton transport

BY SERGEY BUKHDRUKER, IVAN GUSHCHIN, VITALY SHEVCHENKO, KIRILL KOVALEV, VITALY POLOVINKIN, FEDOR TSYBROV, ROMAN ASTASHKIN, ALEXEY ALEKSEEV, ANATOLY MIKHAYLOV, SIARHEI BUKHALOVICH, [...] VALENTIN GORDELIY +20 authors • 16 APR 2025

Bacteria aptly use fundamental mechanisms for light-driven proton transfer across a membrane.

ABSTRACT

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An initiation-related substructure in viral RNA-dependent RNA polymerases refolds to fulfill a different function at elongation.

ABSTRACT

Molecular basis of pyruvate transport and inhibition of the human mitochondrial pyruvate carrier

BY MAXIMILIAN SICHROVSKY, DENIS LACABANNE, JONATHAN J. RUPRECHT, JESSICA J. RANA, KLAUDIA STANIK, MARIANGELA DIONYSOPOULOU, ALICE P. SOWTON, MARTIN S. KING, SCOTT A. JONES, LEE COOPER, [...] EDMUND R. S. KUNJI +11 authors • 18 APR 2025

The mitochondrial pyruvate carrier transport mechanism is Δ pH driven and is inhibited competitively by distinct compound classes.

ABSTRACT

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