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SOCIAL AND INTERDISCIPLINARY SCIENCES AND PUBLIC HEALTH

Technological complexity and combinatorial invention in small-scale societies

BY MARCUS J. HAMILTON, JOSÉ LOBO, MARK COLLARD, ROBERT S. WALKER, BRIGGS BUCHANAN • 24 SEP 2025

More complex technologies might solve more problems, but only with more costs, even in traditional societies.

ABSTRACT

Exploring nationwide patterns of sleep problems from late adolescence to adulthood using machine learning

BY ADRIAN D. ZUCCO, HENNING JOHANNES DREWS, JEROEN F. ULEMAN, SAMIR BHATT, NAJA HULVEJ ROD • 24 SEP 2025

Sleep problems from late adolescence to adulthood have increased in the past 10 years and can be linked to complex factors.

ABSTRACT

NEUROSCIENCE

Impaired macroautophagy in oligodendrocyte precursor cells suppresses neuronal plasticity via a senescence-associated signaling

BY HONG CHEN, YAN-YUN SUN, QI-FA LI, YU-TONG DU, NA-NA HU, [...] QUAN-HONG MA +14 authors • 24 SEP 2025

Senescent OPCs, caused by a declined autophagy, suppress neuronal firing and excitatory transmission via CCL3/5-CCR5 signaling.

ABSTRACT

Synchronization of women's menstruation with the Moon has decreased but remains detectable when gravitational pull is strong

BY CHARLOTTE HELFRICH-FÖRSTER, ESTHER D. DOMENIE, OLIVER MITESSER, THOMAS HOVESTADT, ALBERTO FERLIN, [...] SARA MONTAGNESE +2 authors • 24 SEP 2025

In modern times, menstrual cycles run in synchrony with the Moon only during Perihelion and Minor Lunar Standstills.

ABSTRACT

BDNF-driven synaptic plasticity requires autocrine matrix metalloproteinase–9 activity

BY DIANA LEGUTKO, ŁUKASZ BIJOCH, GRZEGORZ OLSZAK, BOŻENA KUŹNIEWSKA, KATARZYNA KALITA, [...] PIOTR MICHALUK +2 authors • 24 SEP 2025

Extracellular protease, MMP-9, controls structural synaptic plasticity by regulating TrkB activation at a single synapse.

ABSTRACT

A sensory and motor neuropathy caused by a genetic variant of *NAMPT*

BY ZHE ZHANG, JACEK PILCH, SAMUEL LUNDT, NANNAN ZHANG, YONGCHANG CHANG, [...] SHINGHUA DING +9 authors • 26 SEP 2025

The paper reports on a sensory and motor neuropathy caused by an NAMPT genetic variant.

ABSTRACT

Salient experiences enhance mundane memories through graded prioritization

BY CHENYANG (LEO) LIN, WEN WEN, PHILLIP (XIN) CHENG, SETH SCHALLIES, SHREY GROVER, ROBERT M. G. REINHART • 24 SEP 2025

Emotional events strengthen otherwise forgettable memories by prioritizing those that share key features.

ABSTRACT

An interoceptive model of energy allostasis linking metabolic and mental health

BY SARA Z. MEHRHOF, HUGO FLEMING, CAMILLA L. NORD • 24 SEP 2025

Interactions between metabolic interoception and regulation may drive comorbidity between mental and metabolic ill-health.

ABSTRACT

EARTH, ENVIRONMENTAL, ECOLOGICAL, AND SPACE SCIENCES

Pervasive sex-dependent effects in the genetic architecture of starvation resistance in *Drosophila melanogaster*

BY JUNHAO CHEN, CHENLU LIU, WEIXUAN LI, ANDREW G. CLARK, ZHIJUAN WANG, JIAN LU • 26 SEP 2025

Genetic architecture of starvation resistance in *Drosophila*: ~70% candidate genes exhibit sex-dependent effects.

ABSTRACT

Slab tearing and segmented subduction termination driven by transform tectonics

BY BRANDON SHUCK, BRIAN BOSTON, SUZANNE M. CARBOTTE, SHUOSHUO HAN, ANNE BÉCEL, [...] HAROLD TOBIN +9 authors • 24 SEP 2025

Transform faults act as tectonic segmentation boundaries, enabling diachronous slab detachment and subduction termination.

ABSTRACT

Endo-exo framework for a unifying classification of episodic landslide movements: Implications for forecasting catastrophic failures

BY QINGHUA LEI, DIDIER SORNETTE • 24 SEP 2025

Landslides may not remain at criticality: Episodic dynamics shaped by endo-exo interplay reveal key paths to catastrophic failure.

ABSTRACT

PHYSICAL AND MATERIALS SCIENCES

Monolithic multimodal neural probes for sustained stimulation and long-term neural recording

BY LUXI ZHANG, SHENGMING WANG, JIE XIA, BOYU LI, SHAOMIN ZHANG, [...] SHURONG DONG +9 authors • 26 SEP 2025

Direct laser writing embeds electrodes on optical fibers, producing neural probes for brain electrophysiology regulation.

ABSTRACT

Liquid crystal–guided DNA information storage: Nondestructive recovery and long-term preservation

BY YI ZHANG, YANGYI LIU, LI MIAO, HUAXIA ZHU, YUBIN REN, [...] KAI LIU +9 authors • 24 SEP 2025

Liquid crystal–guided DNA information preservation platform is developed for large-scale and long-term digital storage.

ABSTRACT

Interfacial chain-growth polymerization enables polypropylene-like and circular polythioglycolide

BY YANCHAO WANG, SHILONG WU, JINLONG CHEN, CHENYANG GUO, MAOSHENG LI, [...] EUGENE Y.-X. CHEN +5 authors • 24 SEP 2025

A recyclable polymer rivaling polypropylene in strength and processability was made via a green interfacial polymerization method.

ABSTRACT

Neuromorphic olfaction with ultralow-power gas sensors and ovonic threshold switch

BY MINGU KANG, JOON-KYU HAN, KICHUL LEE, JAESEOK JEONG, CHANYOUNG YOO, [...] INKYU PARK +6 authors • 24 SEP 2025

A neuromorphic olfactory system using low-power µLED gas sensors and an ovonic threshold switch for real-time gas classification.

ABSTRACT

Physics-informed deep learning for plasmonic sensing of nanoscale protein dynamics in solution

BY CHENCHEN WU, SHIYU YANG, KEBO ZENG, XIAOKANG DAI, YU DUAN, [...] QING DAI +5 authors • 26 SEP 2025

An infrared metasurface combined with physics-informed AI enables sensing of nanoscale protein dynamics in solution.

ABSTRACT

Scalable deep learning reconstruction for accelerated multidimensional nuclear magnetic resonance spectroscopy of proteins

BY YIHUI HUANG, YUNCHENG GAO, ZHANGREN TU, TATIANA AGBACK, VLADISLAV OREKHOV, [...] XIAOBO QU +5 authors • 26 SEP 2025

Separable dimensional deep learning provides robust and fast high-dimensional nuclear magnetic resonance spectroscopy of proteins.

ABSTRACT

Quantum-enhanced multiparameter sensing in a single mode

BY CHRISTOPHE H. VALAHU, MATTHEW P. STAFFORD, ZIXIN HUANG, VASSILI G. MATSOS, MAVERICK J. MILLICAN, [...] TING REI TAN +4 authors • 24 SEP 2025

Quantum states are used to measure position and momentum with uncertainties simultaneously beyond classical limits.

ABSTRACT

Optical tweezers with light aligned along the particle's trajectory enable playing tennis with light rackets

BY ALI DROBY, MOHAMMAD ATTRASH, HANI BARHUM, NITZAN SHANI, YAEL ROICHMAN, TAL CARMON • 24 SEP 2025

Tennis is played with light rackets, 57,600 strikes/min on a court mere hair-widths long, with a ball $^1/_{10}$ that size.

ABSTRACT

How sighing regulates pulmonary surfactant structure and its role in breathing mechanics

BY MARIA C. NOVAES-SILVA, MARIANA RODRÍGUEZ-HAKIM, BENJAMIN R. THOMPSON, NORMAN J. WAGNER, ELINE HERMANS, [...] JAN VERMANT +1 authors • 24 SEP 2025

Sigh-induced structural changes lower alveolar surface stress through a mechanical response.

ABSTRACT

Floquet topological states in time-varying metasurfaces

BY QIAN MA, JIAN WEI YOU, LONG CHEN, ZE GU, SHI LONG QIN, [...] TIE JUN CUI +1 authors • 26 SEP 2025

Floquet topological states and harmonic generations are experimentally observed in time-varying metasurfaces.

ABSTRACT

Laser-architected MXene composite for photoenhanced microsupercapacitor

BY YONGJIU YUAN, MISHENG LIANG, TONG LI, RUI YOU, WAI KIN LO, [...] STEVEN WANG +4 authors • 24 SEP 2025

A laser-architected MXene-graphene composite with record-breaking photoenhanced energy storage performance is developed.

ABSTRACT

Addressing transconductance-bandwidth trade-off by three-dimensional electrolyte-surrounded organic electrochemical transistors

BY YONGWOO LEE, SEONG JUN PARK, JIMIN KWON, KANG-IL SONG, SUNGJUNE JUNG • 26 SEP 2025

An OECT architecture with multidirectional ion doping breaks g_m-bandwidth trade-off, advancing high-frequency neural sensing.

ABSTRACT

Acoustically powered micro-clampbot for single-particle transportation

BY ZHIKUN MIAO, TAO PENG, AN REN, HONGSHU HUANG, SIYANG LI, [...] WEI YANG +9 authors • 24 SEP 2025

An acoustically controlled microrobot enables precise clamping and transport of microobjects.

ABSTRACT

Cascaded amplification of air lasing

BY XU LU, SIYI HE, PENGYU XUE, YEWEI CHEN, NING ZHANG, [...] JINPING YAO +3 authors • 26 SEP 2025

A cascaded amplification strategy is proposed, which results in a 40-fold enhancement in air lasing energy.

ABSTRACT

Processing soft thin films on liquid surface for seamless creation of on-liquid walkable devices

BY ZIYU CHEN, MENGTIAN YIN, BAOXING XU • 24 SEP 2025

HydroSpread technology enables fabrication and laser patterning of soft films on liquid surfaces for on-liquid devices.

ABSTRACT

Dynamics of photonic toroidal vortices mediated by orbital angular momenta

BY XIN LIU, NIANJIA ZHANG, QIAN CAO, JINSONG LIU, CHUNHAO LIANG, [...] YANGJIAN CAI +1 authors • 26 SEP 2025

Toroidal light vortices twist, break, and reform in spacetime, revealing routes for controlling and transporting light.

ABSTRACT

Ultrabroadband plug-and-play photonic tensor core packaging with sub-dB loss

BY ERIK JUNG, HELGE GEHRING, FRANK BRÜCKERHOFF-PLÜCKELMANN, LINUS KRÄMER, CLARA VAZQUEZ-MARTEL, [...] WOLFRAM PERNICE +1 authors • 26 SEP 2025

Plug-and-play fiber-to-chip connection allows low-loss, multiport, and versatile photonic tensor core packaging.

ABSTRACT

Quantum fluids of light in 2D artificial reconfigurable aperiodic crystals with tailored coupling

BY SERGEY ALYATKIN, KIRILL SITNIK, VALTÝR KÁRI DANÍELSSON, YAROSLAV V. KARTASHOV, JULIAN D. TÖPFER, [...] PAVLOS G. LAGOUDAKIS +1 authors • 24 SEP 2025

Exciton-polariton condensates synchronize and reveal nontrivial phases in all-optical 2D aperiodic Penrose tiling.

ABSTRACT

BIOMEDICINE AND LIFE SCIENCES

Nanomedicine targeting PPAR in adipose tissue macrophages improves lipid metabolism and obesity-induced metabolic dysfunction

BY CATHERINE C. APPLEGATE, YIFEI KANG, HONGPING DENG, DONGLAI CHEN, NATALIA Y. GONZALEZ MEDINA, [...] ANDREW M. SMITH +9 authors • 26 SEP 2025

Obesity is combated by converting body fat into energy through browning of adipose tissue with targeted nanomedicines.

ABSTRACT

Evolutionary selection of trimethoprim-resistant *dfrA* genes in lytic phages affects phage and host fitness during infection

BY KAI WANG, JIKAI XU, XUDONG LI, PENGFEI ZHU, RUIJIE SUO, [...] DONGHAI PENG +9 authors • 26 SEP 2025

Lytic phages for phage therapy carry abundant ARGs that rarely spread to bacteria but enhance phage and host fitness.

ABSTRACT

Lysosomal LRRC8 complex impacts lysosomal pH, morphology, and systemic glucose metabolism

BY ASHUTOSH KUMAR, YONGHUI ZHAO, LITAO XIE, RAHUL CHADDA, JOHN D. TRANTER, [...] RAJAN SAH +15 authors • 26 SEP 2025

Lysosomal LRRC8 channels regulate lysosomal pH, skeletal muscle signaling, insulin sensitivity, and systemic glycemia.

ABSTRACT

Steric repulsion counteracts ER–to–lipid droplet protein movement

BY ALICIA DAMM, MOHYEDDINE OMRANE, OZREN STOJANOVIĆ, BIANCA M. ESCH, MEHDI ZOUIOUICH, [...] ABDOU RACHID THIAM +4 authors • 26 SEP 2025

Steric hindrance affects the relocation of ER-to-LD proteins and primarily regulates the LD proteome.

ABSTRACT

KMT2D temporally activates neuronal transcriptional factor genes to mediate cerebellar granule cell differentiation

BY SHILPA S. DHAR, KYUNG-PIL KO, JINHO JANG, CALENA BROWN-ABEL, TAO LIN, [...] MIN GYU LEE +4 authors • 26 SEP 2025

KMT2D temporally orchestrates differentiation of cerebellar granule cells, which are a vast majority of neurons in the cerebellum.

ABSTRACT

Laser speckle particle sizer (SPARSE) informs the size distribution of tissue granularities

BY ZEINAB HAJJARIAN, NICHALUK LEARTPRAPUN, ZIQIAN ZENG, SEEMANTINI K. NADKARNI • 26 SEP 2025

Size distribution of particles within intact tissue is mapped by the noninvasive laser speckle particle sizer (SPARSE).

ABSTRACT

MSC-encapsulated porous microparticle eye drops for autoimmune dry eye disease treatment in NOD mice

BY TAIGE CHEN, RUI LIU, QIN CHEN, XUEBING FENG, BIN KONG, YUANJIN ZHAO • 24 SEP 2025

MSC-loaded porous microcarriers improve retention and immune regulation for treating autoimmune dry eye disease.

ABSTRACT

Elucidating the structure and assembly mechanism of actinoporin pores in complex membrane environments

BY ROCÍO ARRANZ, CÉSAR SANTIAGO, SIMONAS MASIULIS, ESPERANZA RIVERA-DE-TORRE, JUAN PALACIOS-ORTEGA, [...] JAIME MARTÍN-BENITO +6 authors • 24 SEP 2025

From soluble monomers to membrane disruptors, cryo-electron microscopy reveals the structural path to pore formation in PFTs.

ABSTRACT

The MC4-La1 cleavage module restricts plant virus infection by integrating R-motif–mediated defense mRNA translation

BY QINGLIN PI, RUJIAN HU, NING YUE, ZHIHAO JIANG, JING WEI, [...] DAWEI LI +5 authors • 24 SEP 2025

The MC4-La1 cleavage module links R-motif–mediated cap-independent defense mRNA translation to activate plant antiviral immunity.

ABSTRACT

Glioblastoma exploits ATP from leading-edge astrocytes to fuel its infiltrative growth revealed by spatially resolved chimeric analysis

BY GAOXIA YANG, XIAODONG NIU, JIEYING GAN, TIANPING YU, MENGHAN LI, [...] RAN ZHOU +8 authors • 24 SEP 2025

Creatine kinase–mediated metabolic support drives infiltrative glioblastoma growth at the astrocyte-rich tumor edge.

ABSTRACT

Human precursor T follicular regulatory cells are primed for differentiation into mature Tfr and disrupted during severe infections

BY JANYERKYE TULYEU, JONAS N. SØNDERGAARD, DAVID G. PRIEST, TAKESHI EBIHARA, HISATAKE MATSUMOTO, [...] JAMES B. WING +7 authors • 26 SEP 2025

The loss of naive-like precursor T follicular regulatory cells during COVID-19 correlates with autoantibody production.

ABSTRACT

Gut epithelium modifies enteric behaviors during nutritional adversity via distinct peptidergic signaling axes

BY SUROJIT SURAL, ZION WALKER, OLIVER HOBERT • 24 SEP 2025

Gut epithelium modulates output from distinct enteric circuits by altering secretion of insulin and noninsulin peptides.

ABSTRACT

Age-related remodeling of the sialoglycans dampens murine CD8$^+$ T cell function

BY HANLIN ZHANG, C. KIMBERLY TSUI, JESSE GARCIA CASTILLO, ESTHER JEONG YOON KIM, AUDREY EVANGELISTA, [...] ANDREW DILLIN +6 authors • 26 SEP 2025

Age-related changes in glycocalyx are associated with reduced T cell responsiveness.

ABSTRACT

Reinforced plant-derived lipid nanoparticles for oral precise epigenome editing in colonic diseases

BY QIANG GAO, YUNXIA GAO, YINGUI CAO, HAITING XU, YA MA, [...] BO XIAO +10 authors • 26 SEP 2025

Oral nanomedicines treat colonic diseases through epigenome editing.

ABSTRACT

Engineered basement membrane mimetic hydrogels to study mammary epithelial morphogenesis and invasion

BY JANE A. BAUDE, MEGAN D. LI, SABRINA M. JACKSON, ABHISHEK SHARMA, DANIELLA I. WALTER, RYAN S. STOWERS • 26 SEP 2025

A modular, tunable platform helps unravel cell-matrix interactions and drives tissue growth.

ABSTRACT

Targeted inhibition of hepatic de novo ceramide synthesis ameliorates MASH

BY XIAODONG YU, CHENYUAN HUANG, MARTIJN EVERS, JINGJING LIU, HUI JUN TING, [...] JIONG-WEI WANG +18 authors • 26 SEP 2025

Hepatocyte-targeted siRNA silencing of ceramide production ameliorates MASH in young and aged mice.

ABSTRACT

USP13 stabilizes NLRP3 to facilitate inflammasome activation by preventing TRIM31-mediated NLRP3 ubiquitination and degradation

BY YA-TING LI, KE-YING LI, SHOU-SONG TAO, TING WANG, YING LU, [...] RONG-HUA YIN +11 authors • 26 SEP 2025

USP13 promotes NLRP3 inflammasome activation by enhancing NLRP3 protein stability.

ABSTRACT

AggreBots: Configuring CiliaBots through guided, modular tissue aggregation

BY DHRUV BHATTARAM, XIAN GOLESTAN, XUANSHUO ZHANG, SHIHONG YANG, ZHUOWEI GONG, [...] XI REN +4 authors • 26 SEP 2025

Multispheroid aggregation augments control over CiliaBot motility by configuring tissue morphology and active cilia distribution.

ABSTRACT

Cryo-EM snapshots of NMDA receptor activation illuminate sequential rearrangements

BY JAMIE A. ABBOTT, JUNHOE KIM, BEIYING LIU, GABRIELA K. POPESCU, ERIC GOUAUX, FARZAD JALALI-YAZDI • 24 SEP 2025

Opening of the NMDA receptor involves bending of the helices lining the ion channel gate.

ABSTRACT

A microneedle device for rapid dermal interstitial fluid sampling

BY ANDY H. HUNG, NETRA U. KAMAT, ABEL BERMUDEZ, STEPHANIE M. BOCZEK, FERNANDO J. GARCIA-MARQUÉS, [...] JOSEPH M. DESIMONE +8 authors • 24 SEP 2025

A device collects enough skin interstitial fluid for omics studies in just five minutes.

ABSTRACT

STK11 coordinates IL-4 signaling with metabolic reprogramming to control M2 macrophage polarization and antitumor immunity

BY JING YANG, NARESH SINGH, CHENGXIAN XU, DEHUI KONG, SAMANTHA SHARMA, [...] KAI YANG +14 authors • 26 SEP 2025

STK11 acts as a key regulator in M2 polarization through coordinating IL-4 signaling and glutamine metabolism.

ABSTRACT

Development of SARS-CoV-2 as a viral vector: A novel intranasal bivalent vaccine for SARS-CoV-2 and RSV

BY JIAYU XU, MICHELLE CHAMBLEE, FEI JIANG, MAHESH KC, CHENG CHIH HSU, [...] JIANRONG LI +11 authors • 26 SEP 2025

Attenuating SARS-CoV-2 and inserting a stabilized RSV prefusion F gene results in a highly protective bivalent intranasal vaccine.

ABSTRACT

TOC1 phosphorylation disproportionally enhances chromatin binding at rhythmic gene promoters

BY JIAPEI YAN, YING ZHANG, GUOTING CHEN, CUILIN GUI, ZHANGLI TU, [...] DAVID E. SOMERS +3 authors • 26 SEP 2025

TOC1 phosphorylation discriminates between and specifies for rhythmic gene promoters.

ABSTRACT

Structural basis of *Pseudomonas* biofilm-forming functional amyloid FapC formation

BY KASPER HOLST HANSEN, MERT GOLCUK, CHANG HYEOCK BYEON, ABDULKADIR TUNC, EMILIE BUHL PLECHINGER, [...] ÜMIT AKBEY +4 authors • 26 SEP 2025

The structure of FapC reveals how *Pseudomonas* forms biofilms via a unique β solenoid amyloid fold and dynamic assembly pathway.

ABSTRACT

PB2 and NP of North American H5N1 virus drive immune cell replication and systemic infections

BY YOUNG-IL KIM, SEUNG-GYU JANG, WOOHYUN KWON, JAEMOO KIM, DONGBIN PARK, [...] YOUNG KI CHOI +15 authors • 26 SEP 2025

North American H5N1 virus with PB2$_{478I}$ and NP$_{450N}$ mutations infects immune cells and causes severe systemic disease in ferrets.

ABSTRACT

The polymerase-associated factor 1 complex modulates the growth-defense tradeoff in *Arabidopsis*

BY YUYU GUO, CUNLIANG LI, YAO LIU, HANYI MAO, YIN ZHANG, [...] SHUNPING YAN +2 authors • 26 SEP 2025

The salicylic acid receptor NPR1 mediates the degradation of PAF1, which interacts with HDACs to repress defense gene expression.

ABSTRACT

Site-specific adaptive nanovesicles for oral insulin delivery

BY BOZHANG XIA, FENGFEI XU, JUNGE CHEN, SHAOBO SHAN, JIUHENG SHEN, [...] XING-JIE LIANG +14 authors • 24 SEP 2025

Milk-derived nanovesicles enable oral insulin delivery by crossing the gut barrier and targeting the liver.

ABSTRACT

From disorder to icosahedral symmetry: How conformation-switching subunits enable RNA virus assembly

BY SIYU LI, GUILLAUME TRESSET, ROYA ZANDI • 24 SEP 2025

Conformation-switching subunits enable simulations where disordered RNA-protein complexes self-organize into symmetric shells.

ABSTRACT

Repeated oral exposure to H5N1 influenza virus in pasteurized milk does not cause adverse responses to subsequent influenza infection

BY PAMELA H. BRIGLEB, ERICKA KIRKPATRICK ROUBIDOUX, LAUREN LAZURE, BRANDI LIVINGSTON, VICTORIA A. MELIOPOULOS, [...] STACEY SCHULTZ-CHERRY +5 authors • 26 SEP 2025

H5N1 influenza virus in pasteurized milk does not alter immunity in mice, suggesting limited health risks from consumption.

ABSTRACT

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THIS WEEK'S PODCAST

25 SEP 2025 | BY SARAH CRESPI, ANGELA SAINI, TIM APPENZELLER

Salty permafrost's role in Arctic melting, the promise of continuous protein monitoring, and death in the ancient world

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