

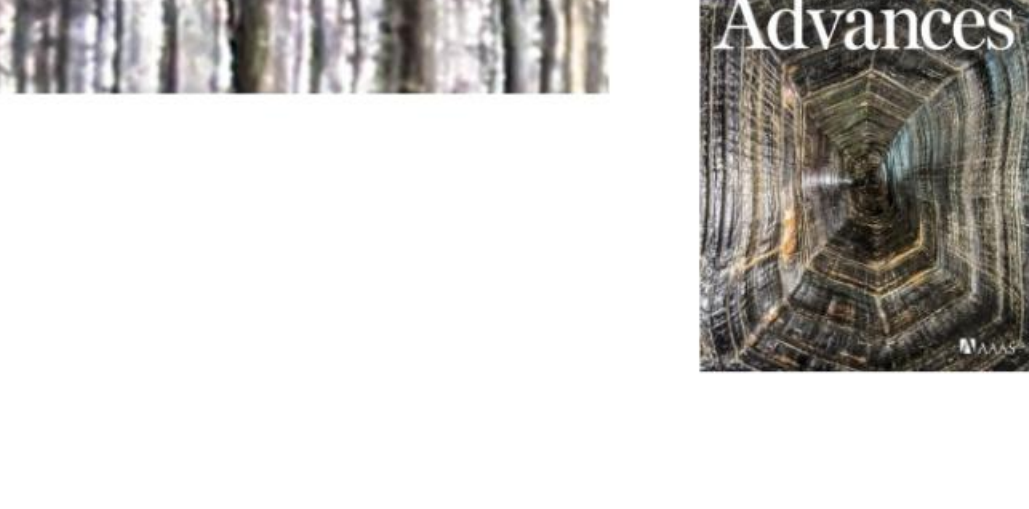
ScienceAdvances

Current Issue First release papers Archive About

Submit manuscript

GET OUR E-ALERTS

HOME > SCIENCE ADVANCES > VOL. 12, NO. 41



SCIENCE ADVANCES

VOLUME 12 | ISSUE 41 | 9 OCT 2026

ONLINE COVER: Dorsal scute of an Aldabra giant tortoise shell. Recent longevity studies have used comparative genomic analysis to reveal gene markers with the potential to slow aging and inhibit cancer in long-lived species. Valvi *et al.* report the first genome sequence of the 194-year-old Aldabra giant tortoise Jonathan, the oldest known living land animal. DNA methylome...

[VIEW MORE](#)

[< PREVIOUS](#) [ALL ISSUES](#) [NEXT >](#)

FOCUS

SOCIAL AND
INTERDISCIPLINARY
SCIENCES AND PUBLIC
HEALTH

NEUROSCIENCE

EARTH,
ENVIRONMENTAL,
ECOLOGICAL, AND SPACE
SCIENCES

PHYSICAL AND
MATERIALS SCIENCES

BIOMEDICINE AND LIFE
SCIENCES

FOCUS

Plenty of fish in the sea, but only one multimodal feather star robot

BY PARKER MCCONNELL, NICOLE W. XU • 87 OCT 2026

[ABSTRACT >](#)

RELATED RESEARCH ARTICLE

Minimal-actuation feather star–inspired soft swimmers for multimodal 3D maneuverability

BY HAITAO QING, YUANHANG ZHU, ET AL. • SCIENCE ADVANCES • 7 OCT 2026

SOCIAL AND INTERDISCIPLINARY SCIENCES AND PUBLIC HEALTH

Rise and spread of lead-silver metallurgy deciphered from peatland archives

BY HAZO DELLE, ANDRIE MARIE DENDIEVEL, LAURA CHOLET, SOFIA COLO, ADRIEN BARRA, JANNIE BUCHERT TOFT • 87 OCT 2026

[ABSTRACT >](#)

Neanderthal woodworking at Abric Romani: Insights into the role of wood in a Middle Palaeolithic domestic context

BY PAULINA SALADIÉ, M. ISMA CHACÓN, ALEX SOULÉ, ÉTHEL ALLUÉ, JUAN MARTÍN HERNÁNDEZ, BRUNO GÓMEZ DE SOLER, FRANCISCA ROMÁNOL, AMELIA BARRALÓ, MANUEL VAQUERO, PAULA MATEO-LIMBA, [...] JOSEP VALLEJO • +10 authors • 87 OCT 2026

[ABSTRACT >](#)

NEUROSCIENCE

Dopamine release–associated striatal blood oxygenation and whole-brain dynamics during associative learning

BY HANF LARSEN, ISABELLA R. BUCO, DANIELA LUDTMANN, DARCY S. PETERKA, HIRSHUL J. ABEDUS-SABOOR, TIAMAR KAHN • 87 OCT 2026

[ABSTRACT >](#)

Specific expertise from diffuse feedback: A feedforward-gated mechanism

BY RUNING GUO, AN YAN, MINGSHU CHEN, WU LI, YIN YAN • 87 OCT 2026

[ABSTRACT >](#)

MIMAS: An open-source microlens-array miniature microscope for accessible large-field cortical imaging in freely behaving mice

BY MIAN XIE, JUNYI MA, BAOYI CHANG, JIAN LI, HONGSIA YIN, YUANFENG JIANG, YUJI ZHAO, YUNJUN QIAN, ZENGCAI Y. GUO, WENHAO LIU, [...] LIANGYI CHEN • +2 authors • 87 OCT 2026

[ABSTRACT >](#)

EARTH, ENVIRONMENTAL, ECOLOGICAL, AND SPACE SCIENCES

Predicting regional gray swans via translocation: AI weather models and Dubai’s unprecedented 2024 rainfall

BY Y. QIANG SUN, PEDRAM HASSANZADEH, TIFFANY SHAH, HANAD A. PAHLAVAN, ADAM MARCHANTUS • 87 OCT 2026

[ABSTRACT >](#)

From plankton to fish: 21st-century redistribution of marine biodiversity and the changing role of rare species

BY ELENA KIE, LILY ORSH, GEORG H. ENGELHARDT, JOHN K. PINKNEY, KEITH M. COOPER, PIERRE HÉLADÉ, LAURINE PECUCHE, MYRON A. PECK, MARTIN LINDEGREN, MURRAY S. A. THOMPSON • 87 OCT 2026

[ABSTRACT >](#)

Surface temperatures drive strong seasonality in urban reactive carbon emissions

BY MICHAEL P. VERMEIJER, DYLAN B. MILLET, ROSIN COMMANE, TIMOTHY J. GREFF, TREV A. MAGGALENO, EMILY S. FRANKLIN, KATELYN L. RICHARD, ROSE K. ROBBELL, JEFF PEISCHL, DELPHINE K. FARMER • 87 OCT 2026

[ABSTRACT >](#)

A 256-year daily rainfall record reveals multiscale rainy-season variability and emerging hydroclimatic hazard over northern East Asia

BY KUCI WANG, YONG WEL, ZHONGSUA YAO, SHILONG YANG, FENG SHI, WEL LIN • 87 OCT 2026

[ABSTRACT >](#)

Embryos resolve the enigmatic origin of the theropod wishbone

BY BRIGITTA JAMES VILLALON, FELIPE GUZARDO-PEZO, MARCELAENNA NARVAEZ, DANIEL SMITH-PAREDES, TIANA KOHLBOORN, JIAO F. BOTTELDO, ALEXANDER D. VARRAS • 87 OCT 2026

[ABSTRACT >](#)

Escalating soil CO₂ degassing correlates with ground uplift and seismicity during the ongoing unrest of Campi Flegrei (2005–2025)

BY BRIGITTA JAMES VILLALON, FELIPE GUZARDO-PEZO, MARCELAENNA NARVAEZ, DANIEL SMITH-PAREDES, TIANA KOHLBOORN, JIAO F. BOTTELDO, ALEXANDER D. VARRAS, [...] STEFANO CALIRO • +7 authors • 87 OCT 2026

[ABSTRACT >](#)

PHYSICAL AND MATERIALS SCIENCES

AIMNet2-rxn: A machine-learned potential for generalized reaction modeling on a millions-of-pathways scale

BY DYLAN M. ANSTINE, QIYAN ZHAO, ROMAN ZUBATYK, SHUAO ZHANG, VEERUPAKSH SINGLA, FILIPP KRITIN, BRETT M. SAVOIE, ALEXANDER SHAYEV • 87 OCT 2026

[ABSTRACT >](#)

3D DNA origami-enabled molecularly addressable optical nanocircuit

BY JAYWON LEE, HAYUN AHN, KYUNG HUN RHO, SHELLEY F. J. WOODHAM, WILLIAM M. SHAH, SEUNGWOO LEE • 87 OCT 2026

[ABSTRACT >](#)

Optical resolution of H/D isotopic chirality via asymmetric C–H amination

BY TATSUYA UCHIDA, YUTA NAKADAKI, NAOKI WATABE, YOUTA KAWASAKI • 87 OCT 2026

[ABSTRACT >](#)

Correlated one-dimensional electron conduction in ferroelastic domain walls through nematic-like charge stripes

BY MINHO KANG, DYLAN LEE, WOOON YANG, SHINHEE YUN, KYUNG SONG, JESUNGDAE SEO, SI-YOUNG CHOI, TAE-HWAN KIM, YEONDOHWAN KIM, CHAN-HO YANG • 87 OCT 2026

[ABSTRACT >](#)

Self-buoyant cell-spheroid culture programming multi-spheroid assembly

BY YUNHANG HANG, BING WEL, YUEYANG SUN, WEIFENG LAU, HUI ZHANG, XIAOGE QIN, CHANGFENG ZHANG, XINCHUN LI, FAN YANG • 87 OCT 2026

[ABSTRACT >](#)

Wafer-scale synthesis of WSe₂ for high-performance p-type top-gated transistors and logic circuits

BY JONGHYU CHOI, HAYOUNG KIM, SEUNGDOO KIM, MINYU KIM, BEUNGMIN YANG, JUYEONG HONG, SEOKMIN YUN, JIUT K. KATHYAR, JONG-HYUN AHN • 87 OCT 2026

[ABSTRACT >](#)

Packing-accelerated consecutive NIR excitation (PACE) enables high energy photocatalysis and antimicrobial immunity in vivo

BY YOSHIN LIAI, SHAO WANG, WENBO HUI, HAOJIAN GUO, ZAFAR MAHMOOD, YUSUN LIAO, YANNA PAN, XIAOFEN WANG, YUNMEI WANG, ZHENYU ZHANG, [...] YULING XIAO • +7 authors • 87 OCT 2026

[ABSTRACT >](#)

Solution-processed organic infrared photodetectors operating beyond 1.4 μm for sensitive environmental monitoring

BY YIFEI GENG, TENGFEI LI, ZHENSHEN ZHANG, HUIQING HOU, YUZE LIN • 87 OCT 2026

[ABSTRACT >](#)

Minimal-actuation feather star–inspired soft swimmers for multimodal 3D maneuverability

BY HAITAO QING, YUANHANG ZHU, JIACHENG GUO, CAIZH ZHOU, HAOZE SUN, HAIBO DONO, DANIEL QUINN, JIE YIN • 87 OCT 2026

[ABSTRACT >](#)

RELATED FOCUS

Plenty of fish in the sea, but only one multimodal feather star robot

BY PARKER MCCONNELL, NICOLE W. XU • SCIENCE ADVANCES • 7 OCT 2026

Spin force from a nitrogen-vacancy ensemble drives a 100-mg levitated resonator

BY ANISHKAMAN NAVAK, DAHEE KIM, SHULI TIAN, JASON TWAMLEY • 87 OCT 2026

[ABSTRACT >](#)

Dynamic self-polarization of the nuclear spins in a GaAs quantum well

BY MALASSEN KOTLAR, DENNIS KULACKI, NATALIA E. KORTOVA, ERIK KRISTEN, SMITH R. YAKOVLEV, KIRILL V. KAYOVIN, MANFRED BAYER • 87 OCT 2026

[ABSTRACT >](#)

Mitigating lateral sensing blind spots: A dual-segment bronchoscopic robot with a bioinspired skin

BY QIQI PAN, WEIWEI DUAN, JINGJING LIU, LEI WANG, SHAJIE GUO, YONGFEI FENG, HONGBO WANG • 87 OCT 2026

[ABSTRACT >](#)

A biohybrid mesh harvester for distributed energy harvesting in living tissues

BY SIQI WANG, XIAOYU WANG, SHUAI FU, CLAIRE SENIGER, JACOB PFUND, MENKA JAIN, REIKA KATSURAMATA, JUN YAO • 87 OCT 2026

[ABSTRACT >](#)

A solid magnesium zincate for hydrogen-methane evolution

BY SHEETAL KATHAVAT BISHT, POORNA GOMATHASANKARAN, ALEX P. ANDREWS, AJAY VENUGOPAL • 87 OCT 2026

[ABSTRACT >](#)

BIOMEDICINE AND LIFE SCIENCES

Epigenetic insights into extreme longevity in the world’s oldest terrestrial animal, Jonathan

BY SELAJIAN VADIVEL, DANIEL F. SCHMITT, ANGELA JONES, VINAYAK KAPATKAL, JAMES M. FORD, MADISON L. TAYLOR, NATHA COULWELL, JONATHAN HOLLINS, SAM PASQUCCI, KONSTANTIN WEIDENKOW, [...] STEPHEN W. CLARK • +11 authors • 87 OCT 2026

[ABSTRACT >](#)

Rapid protamine evolution suppresses meiotic drive in *Drosophila*

BY CHANGHO CHANG, ALEX FLOR, A. DE LA CRUZ, HONG YU LAI, ISABEL MEJIA NATIVIDAD, ALEX NOTICIA, ELIAN ANGELO MANSINO ABELLANOSA, NICOLAS D. LEB, HUMAIT S. MALIK • 87 OCT 2026

[ABSTRACT >](#)

Real-time single-molecule imaging in zebrafish embryos uncovers noncanonical translation

BY MARILYN BELLEVILLE, JIE LIANG, ARNOY MANTONNET, TATSUYA MORISAWA, MARISAUX LEO, HANS MARTIN NAUSSOIREN, DAMIEN AVHENS, VINCENT MARTINET, DELPHINE MORAUX, TIMOTHY J. STABEYCH, [...] JODER Y. B. STANIER • +1 authors • 87 OCT 2026

[ABSTRACT >](#)

Clonal lineage tracing and parallel multiomics profiling reveal transcriptional heterogeneity induced by ARID1A deficiency

BY KUNYONG MEYER, LUYING YANG, YONGJIAO YANG, HONGYU KOSCHINSKI, REO MARIYAMASA • 87 OCT 2026

[ABSTRACT >](#)

Endogenous retrovirus control of calbindin is essential for human early embryogenesis

BY JESSIE PAPE, AFSHAN MCCARTHY, EDUARDO BERRA-MORALES, BORZO CHARRIEL, TOBIAS PLOMMAN, ELIAS COPIN, RACHAEL THOMPSON, LAURA DOOLIS, RITA MELECHTYE-MARTINEZ, LYNN HEALY, [...] GEORGE KASSOTIS • +4 authors • 87 OCT 2026

[ABSTRACT >](#)

Targeted integration of extrachromosomal arrays in *C. elegans* using PhiC31 integrase

BY MATTHEW S. RICH, RYAN PELLOW, YICHEN ZHANG, ADAM HEFEL, OFER ROO, ERIC M. JØRGENSEN • 87 OCT 2026

[ABSTRACT >](#)

Kupffer cells are key mediators of antigen-specific immune tolerance by peptide-coupled red blood cells

BY VASILEIA KALAITZAKI, PIETRO OLIVATI, FILIPA M. FERREIRA, ANTONIOS KATSOULAKI, AHMED ALI, LUYO BABELOLA, YAN LIU, JINCHENG FANG, ROMAN SANKOVSKI, MAI MATSUBIHTA, [...] THORSTEN BUCH • +5 authors • 87 OCT 2026

[ABSTRACT >](#)

Cis-regulatory inactivation of vitamin D signaling confers extreme calcium tolerance in Jialing fish

BY NAN ZHANG, YONGSEN ZHOU, JIANBIN FENG, TIANHAO YANG, HAILIN LIU, YONGSHENG ZHANG, LINDIYUN CHEN, WEIYANG XIAO, TAI WANG, JIAON J. W. HSEIH, JIANZHEN LI • 87 OCT 2026

[ABSTRACT >](#)

Rod photoreceptors have a dual dependency on both aerobic glycolysis and OXPHOS and diverge metabolically from other retinal neurons

BY GABRIELE M. WÖSTENSTEIN, LUCA RAVOTTO, VYARA TODOROVA, RACHEL M. MEISTER, MARILIANA SAMAROLIA, L. FELIPE BARROU, BRUNO WEBER, CHRISTIAN BARRE • 87 OCT 2026

[ABSTRACT >](#)

Translocation-induced enhancer rewiring reveals cryptic oncogenic circuits in multiple myeloma

BY ENRAN ZHENG, QINGSHI LI, XUELIN DOU, YIPING GAO, CHAO REN, FEIYA SUI, LIN LIN, YAN ZHAO, ZHIWEI LIUO, YANG LIU, [...] LUYANG SUN • +16 authors • 87 OCT 2026

[ABSTRACT >](#)

SLC39-driven zinc influx orchestrates pleiotropic tumor–immune system cross-talk to establish immune suppression in colorectal cancer

BY SEOK-JUNE HONG, SEHEUM PARK, SUNGHOON KIM, YOUNG IL PARK, JUN SEOK LEE, MIKYOUNG KANG, JAEWOONG LEE, MARTIN HEMMERL, SUNG EUN KIM, KWONKEEL KIM • 87 OCT 2026

[ABSTRACT >](#)

Machine learning-assisted directed evolution of plant Rubisco

BY JULIE L. MCCONNELL, JIACHENG LIN, YOUNGZHI ZHAO, BRIAN L. HUI, ROSEMARY BIRCH, MARY GEHRING, BRYAN D. BRYSON, SPENCER M. WHITNEY, MATTHEW D. SHOULDER, ROBERT H. WILSON • 87 OCT 2026

[ABSTRACT >](#)

Human trilayer engineered blood vessel reveals influence of fibroblasts on disease progression in model of Hutchinson-Gilford progeria

BY KEVIN L. SHOREL, XIN D. GAO, DAVID H. LU, GEORGE A. TRUSKEY • 87 OCT 2026

[ABSTRACT >](#)

Atomic structure and dynamics of the mechanosensitive channel MscL from *Escherichia coli* by cryo-EM and solid-state NMR

BY TAOHAN XIAO, ALEXANDER KOVACH, CHAOHEI WU, HENRY SAWCZYK, DENIS CORRAL, CARL ÖSTER, THEODO SPINKE, ANTON F. KETZEL, SAROCHA LANDE, SPIRODON KOSTELTOS, [...] ADAM LANDE • +3 authors • 87 OCT 2026

[ABSTRACT >](#)

Herpes simplex virus pUL56 abolishes neuronal activity by removing voltage-gated ion channels from the plasma membrane

BY DANIEL A. NABH, HENRY O. BARRECH, P. ROBIN ANTOBIOS, ALEX S. NICHOLSON, JOHN RUBEN, HARVEY E. JOHNSTON, MARTIN POTTS, MARTA A. ALMEIDA, VALERIA LULLA, COLIN M. CRUMM • +3 authors • 87 OCT 2026

[ABSTRACT >](#)

Exposure route, not dose, is the primary driver of infection patterns for a respiratory virus

BY CELINE E. BRIDGES, DYLAN H. MORRIS, THOMAS C. FRIEDRICH, JAMES O. LLOYD-SMITH • 87 OCT 2026

[ABSTRACT >](#)

Sensory receptor expansion and neural accommodation in butterfly color vision

BY KEVIN SHAO, JULIA ANDRIENHO, ANTOINE DONATI, YUNCHONG ZHANG, MICHELLE FRANK BAGGAC, CARA GENDRUS, ZOE ARDRE, ANDREW TOMERSON, MICHAEL W. PERRY • 87 OCT 2026

[ABSTRACT >](#)

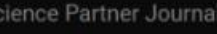
DNA nanodevice-engineered macrophages as living sensors for dual-mode in vivo monitoring of tumor-associated macrophage polarization

BY QIAOMEI WEL, XUE CHEN, PING XIE, LI WANG, LI-JUAN TANG, TIANYUO CHEN, LAN LI, JIANHONG JIANG, YIN CHAO • 87 OCT 2026

[ABSTRACT >](#)

[< PREVIOUS ISSUE](#) [NEXT ISSUE >](#)

RECENT ISSUES

 Vol. 12 No. 41  Vol. 12 No. 40  Vol. 12 No. 39  Vol. 12 No. 38

[VIEW ARCHIVE >](#)

ScienceAdvances

Manage Your Institutional Subscription Library Admin Portal Request a Quote Librarian FAQs

CAREERS Careers Articles Find Jobs Employer Hubs

COMMENTARY Opinion Analysis Blogs

JOURNALS Science Science Advances Science Immunology Science Robotics Science Signaling Science Translational Medicine Science Partner Journals

AUTHORS & REVIEWERS Information for Authors Information for Reviewers

FOLLOW US         

GET OUR NEWSLETTER

© 2026 American Association for the Advancement of Science. All rights reserved. AAAS is a partner of INRAE, AGORA, OARE, CHORUS, CLOCKSS, Crossref and COUNTER. Science Advances ISSN 2375-2548

Terms of Service | Privacy Policy | Cookie Preferences | Accessibility