

12 JUNE 2025 | VOLUME 388 | ISSUE 6752

Thermal imagery captures variation in temperature across a forest canopy in Colorado, US.

SPECIAL ISSUE Plants & heat

FEATURES

1125 Hot zone

In the world's hottest forests. scientists are probing how plants cope with rising temperatures -E. Stokstad PODCAST

BOOKS ET AL.

CREDIT: ANDREW D. RICHARDSON ADAPTED BY M. HERSHER/SCIENCE

1142 North America's last prairies

The region's grasslands-vital ecosystems and carbon sinks-have been farmed and ranched beyond recognition -S. Boon

INTRODUCTION

1146 Plants facing the heat -Madeleine Seale,

Bianca Lopez, Sarah Lempriere

PERSPECTIVES

1148 Can wild plant adaptations help crops tolerate heat? Wild plant species harbor a vast but largely unknown diversity of temperature stress

solutions -S. Yeaman

1150 Plant microbiomes feel the heat

Rising temperatures change the structure and function of plant microbial communities -A.-L. Laine and S. Leino

ON THE COVER



Infrared imaging shows heat levels in sunexposed leaves of Alstonia scholaris from the Australian Wet Tropics. As climate change increases temperatures and the severity of heat waves, both natural ecosystems and agricultural plants are increasingly affected by heat. Examining heat responses at cellular, genetic, physiological, and ecosystem scales, this special issue explores how plants sense and respond to high temperatures. See the section beginning on page 1146. Image: Kali Middleby

REVIEWS

1153 Safeguarding crop photosynthesis in a rapidly warming world -C. J. Bernacchi et al.

1161 Dispersed components drive temperature sensing and response in plants -A. Singh Yadav et al.

1167 Scaling plant responses to heat: From molecules to the biosphere -M.E.K.Evans et al.



PODCAST Hot forests as testbeds for climate change

EDITORIAL

1113 An American research crisis with real human consequences —M. B. Parlange

1115 Strangling intellectual independence --M. S. Harris

NEWS

1116 Did science reformers play into Trump's hands?

Reform movement should have seen call for "gold standard science" coming, critics say -C. O'Grady

1118 Warming threatens fragile pact over Indus River waters

Scientists say India-Pakistan treaty needs to be rethought for a changing world —S. Pathak

1120 Trump budget proposes killing nursing research institute

A tiny sliver of NIH, the institute has provided evidence base for bedside care —M. Wadman

1121 Many scientific societies are losing publishing revenue

Driven largely by open access, the trend puts society programming at risk —J. Brainard

1122 Proposed LIGO cut could snuff out brand new form of astronomy

"You're killing a newborn baby," says one astrophysicist —A. Cho

1124 DNA in the air could track biodiversity—and humans

Technology could be a boon for science, but raises ethical concerns —W. Cornwall

COMMENTARY

PERSPECTIVES

1130 Global nitrogen budget revisited

Bottom sediments are important for nitrogen production in inland and coastal waters —P. L. Brezonik RESEARCH ARTICLE p. 1205

1132 Rethinking jaundice

A buildup of unconjugated bilirubin may be a protective response to malaria —J. Kloehn and D. Soldati-Favre RESEARCH SUMMARY p. 1181

1133 Synthesizing vascular trees at speed

A computational algorithm can render a complex artificial vascular structure in minutes —Y. Y. S. Huang and L. A. Ju **RESEARCH ARTICLE p. 1198**

1134 Bacteria poison and eat their neighbors

Bacteria leverage a secretion system to kill and scavenge nutrients from nearby competitors --C. D. Nadell and C. J. Marx RESEARCH ARTICLE p. 1214

POLICY FORUM

1136 A liability framework for high-risk neural devices

A no-fault compensation scheme may help balance innovation and patient protection —A. Rotenberg *et al.*

1138 New case law and liability risks for manufacturers of medical Al

Recent case law can shape how innovation unfolds -S. Gerke and D. A. Simon

BOOKS ET AL.

1141 Dark matters

A new film celebrates the subterranean -- N. J. Dominy

LETTERS

1143 The hidden costs of gold mining in Ecuador

-D. Cogălniceanu and D. Szekely

1143 Address Arctic shipping

crisis at COP30 —Z. Du et al.

1144 US tariffs jeopardize medicine supply chains

-G. Casiraghi et al.

RESEARCH

HIGHLIGHTS

1174 From *Science* and other journals

RESEARCH SUMMARIES

1177 Bacterial immunity Catl forms filament networks to degrade NAD⁺ during the type III CRISPR-Cas antiviral response -- C. F. Baca *et al.*

1178 Speciation

Introgression dynamics of sex-linked chromosomal inversions shape the Malawi cichlid radiation —L. M. Blumer *et al.*

1179 Cancer genomics

Aberrant basal cell clonal dynamics shape early lung carcinogenesis —S. Gómez-López *et al.*

1180 Enzymology

Evolutionary-scale enzymology enables exploration of a rugged catalytic landscape —D. F. Muir *et al.*

1181 Malaria

A metabolite-based resistance mechanism against malaria —A. Figueiredo *et al.* **PERSPECTIVE p. 1132**

1182 Electrochemistry

Acid-humidified CO₂ gas input for stable electrochemical CO₂ reduction reaction —S. Hao *et al.*

RESEARCH ARTICLES

1183 Device physics

Gate-driven band modulation hyperdoping for high-performance p-type 2D semiconductor transistors —B. Zhao *et al.*

1189 Volcanology

Minute-scale dynamics of recurrent dike intrusions in Iceland with fiber-optic geodesy – J. Li *et al.*

1194 Photophysics

Differential absorption of circularly polarized light by a centrosymmetric crystal –K. A. Parrish *et al.*

1198 Tissue engineering

Rapid model-guided design of organ-scale synthetic vasculature for biomanufacturing --Z. A. Sexton *et al.* **PERSPECTIVE p. 1133**

1205 Nitrogen fixation

Global importance of nitrogen fixation across inland and coastal waters – R. W. Fulweiler *et al.* **PERSPECTIVE p. 1130**

1210 Climate

Observed trend in Earth energy imbalance may provide a constraint for low climate sensitivity models —G. Myhre *et al.*

1214 Microbiology

Antagonism as a foraging strategy in microbial communities —A. K. M. Stubbusch *et al.* **PERSPECTIVE p. 1134**

1218 Virology

Pan-viral ORFs discovery using massively parallel ribosome profiling —S. Weingarten-Gabbay *et al.*

1225 Molecular biology

RNA transcripts regulate G-quadruplex landscapes through G-loop formation —K. Sato *et al.*

WORKING LIFE

1234 How burnout snuck up on me -M. D. Xames

1114 Science Staff **1233** Science Careers

Science serves as a forum for discussion of important issues related to the advancement of science by publishing material on which a consensus has been reached as well as including the presentation of minority or conflicting points of view. Accordingly, all articles published in *Science*—including editorials, news, commentary, and book reviews—are signed and reflect the individual views of the authors are affiliated. *Science* (ISSN 0036-8075) is published weekly on Thursday, except last week in December, by the American Association for the Advancement of Science. JCON lew York Avenue, NW, Washington, DC 20005. Periodicals mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2025 by the American Association for the Advancement of Science. The title Science is a registered trademark of the AAAS. Domestic individual membership, including subscription (IC) monthy): \$165 (\$74 allocated to subscription). Domestic institutional subscription (GI subscription (IC) and memity science. Canadian rates with GST available upon request, GST #125488122. Publications Mail Agreement Number 1069624. Printed in the U.S.A. Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to AAAS, PO. Box 96178, Washington, DC 20090–6178. Single-copy sales: \$15 each plus sciption to reproduce material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Canadian the obtained through the Copyright Clearance Center (CCC), www.copyright.com. The identification code for *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.