

## N. Michele Holbrook

Department of Organismic and Evolutionary Biology, Harvard University  
16 Divinity Avenue, Cambridge, MA 02138  
(617) 7496-0603 | holbrook@oeb.harvard.edu

### Biography:

N. Michele Holbrook is the Charles Bullard Professor of Forestry at Harvard University. Her research focuses on the movement of water and carbon in trees, with an emphasis on biophysical constraints related to water availability and demand. She has made significant contributions to plant physiology, including the key insights and experimental data that showed major artefacts in widespread hydraulic methods, undermining the idea of embolism repair under tension and forcing a re-examination of many concepts in plant hydraulics. She has also shown how scaling of sieve tube structure enables phloem transport to occur in tall and long plants. At Harvard, she teaches courses in plant biology, global food systems, and plant physiology, as well as heads the undergraduate program in Environmental Science and Public Policy.

### Academic Preparation:

Harvard University	Cambridge, MA	Biology	A.B., 1983
University of Florida	Gainesville, FL	Botany	M.S., 1989
Stanford University	Palo Alto, CA	Biological Sciences	Ph.D., 1995

### Appointments:

2006 – Present	Charles Bullard Professor of Forestry, Department of Organismic and Evolutionary Biology, Harvard University
2001 – 2005	Professor, Department of Organismic and Evolutionary Biology, Harvard University
1999 - 2001	Thomas D. Cabot Associate Professor, Department of Organismic and Evolutionary Biology, Harvard University
1995-1998	Assistant Professor, Department of Organismic and Evolutionary Biology, Harvard University

### Current Courses:

OEB 52 Biology of Plants  
OEB 120 Plants and Climate (alternates with OEB 212r Advanced Topics in Plant Physiology)  
In AY 20/21 I will teach an ESPP junior seminar (ESPP 90x) on Ecological Carbon Storage

### University Service:

Head Tutor, Environmental Studies and Public Policy Concentration  
Executive Committee, David Rockefeller Center for Latin American Studies  
Executive Committee, Harvard Forest  
Selection Committee, Rhodes and Marshall Fellowships  
Member, FAS Committee on Professional Conduct  
Interim Director, Harvard Forest (beginning July 2020)

### Professional Service:

Editorial Board, Plant Physiology  
Scientific Advisory Board, DISTAP (Singapore-MIT Alliance for Research and Technology)

### Active Grants:

2019-2021	<b>Starr-Friedman Challenge for Scientific Research, Harvard University:</b> “Impacts of elevated CO <sub>2</sub> on bees and pollination services via alterations in pollen nutrition” (PIs: Holbrook, de Bivort, Myers, Crall) \$269,017
2019-2020	<b>Harvard-UAI Collaborative Research Fund,</b> “Plant water relations in the fog oases of Chile” (PIs: Holbrook, Dumais (UAI) \$30,000

- 2018-2021**     **U.S.-Israeli BARD Fund:** “Regulation of plant transpiration by carbohydrate availability” (PI: Holbrook), \$151,000
- 2018-2021**     **U.S. AFOSR:** “Plant-mimetic functional materials for thermal management and suppression of freezing” (PI: A. Stroock of Cornell \$750,00 full grant, Holbrook Harvard co-PI), \$149,935
- 2015-2020**     **NSF-BIO-IOS:** “Physiology of Long Distance Assimilate Transport” (PI: Holbrook) \$336,696

**Selected Synergistic Activities:**

1. Principal Investigator: IGERT Graduate Training Program in Biomechanics (2003 – 2009)
2. Contributing author (Ch 7) for *The Habitable Planet: A Systems Approach to Environmental Science*: a free, on-line course for high school teachers and college level instruction funded and produced by the Annenberg Foundation: <http://www.learner.org/resources/series209.html>.
3. Instructor, Harvard Life Science Outreach Program, which provides professional development programs for teachers and hands-on laboratories experiences for students throughout New England.
4. Content advisor, MOSART (Misconception Oriented Standards-based Assessment Resource for Teachers) Assessment Team, Science Education Dept., Harvard College Observatory.
5. Contributing author (Chs 8, 27-32) for: *Biology – How Life Works 3<sup>rd</sup> edition*, an introductory life science textbook published by W.H. Freeman, 2019.

**Selected Publications (200 total):**

1. Brodribb, T.J., M. Carriqui, S. Delzon, S.A.M. McAdam, and **N.M. Holbrook**. 2020. Advanced vascular function discovered in a widespread moss. *Nature Plants* 6, 273-279.
2. Rigden, A.J., N.D. Mueller, **N.M. Holbrook**, N. Pillai and P. Huybers. 2020. Combined influence of soil moisture and atmospheric evaporative demand is important for accurately predicting US maize yields. *Nature Food* 1, 127-133.
3. Hochberg, U., A. Ponomarenko, Y.-J. Zhang, F.E. Rockwell and **N.M. Holbrook**. 2019. Visualizing embolism propagation in gas-injected leaves. *Plant Physiology* 180, 874-881.
4. Franks, P.J., G.B. Bonan, J.A. Berry, D.L. Lombardozzi, **N.M. Holbrook**, N. Herold and K.W. Oleson. 2018. Comparing optimal and empirical stomatal conductance models for application in Earth system models. *Global Change Biology* 24, 5708-5723.
5. Savage, J.A., S.D. Beecher, L. Clerx, J.T. Gersony, J. Knoblauch, J.M. Losada, K.H. Jensen, M. Knoblauch and **N.M. Holbrook**. 2017. Maintenance of carbohydrate transport in tall trees. *Nature Plants* 3, 965 - 972..
6. Jensen, K.H., K. Berg-Sorensen, H. Bruus, **N.M. Holbrook**, J. Liesche, A. Shulz, M.A. Zwieniecki and T. Bohr. 2016. Sap flow and sugar transport in plants. *Reviews of Modern Physics* 88(3): [035007]. DOI: 10.1103/RevModPhys.88.035007
7. Knoblauch, M., J. Knoblauch, D.L. Mullendore, J.A. Savage, B.A. Babst, S.D. Beecher, A.C. Dodgen, K.H. Jensen and **N.M. Holbrook**. 2016. Testing the Münch hypothesis of long distance phloem transport in plants. *eLife* 10.7554/eLife.15341.
8. Mueller, N.D., E.E. Butler, K.A. McKinnon, A. Rhines, M. Tingley, **N.M. Holbrook** and P. Huybers. 2016. Cooling of US Midwest summer temperature extremes from cropland intensification. *Nature Climate Change* 6, 317-322.
9. Mello, F.C., C.E.P. Cerri, C.A. Davies, **N.M. Holbrook**, K. Paustian, S.M.F. Maia, M.V. Galdos, M. Bernoux, C.C. Cerri. 2014. Soil carbon and sugarcane ethanol payback time. *Nature Climate Change* 4, 605-609.
10. Myers, S., A. Zanobetti, I. Kloog, P. Huybers, A. Leakey, A. Bloom, E. Carlisle, L. Dietterich, G. Fitzgerald, T. Hasegawa, **N.M. Holbrook**, R. Nelson, M. Ottman, V. Raboy, H. Sakai, K. Sartor, J. Schwartz, S. Seneweera, M. Tausz, Y. Usui, and S. Yoshinanga. 2014. Rising CO<sub>2</sub> threatens human nutrition. *Nature* 510, 139-142.