PITTMED

PUBLISHER
Arthur S. Levine, MD

EDITOR IN CHIEF
Erica Lloyd

ART DIRECTOR
Elena Gialamas Cerri

SENIOR EDITOR
Elaine Vitone

ASSOCIATE EDITOR
Robyn K. Coggins

CONTRIBUTING EDITOR
Chuck Staresinic

INTERN
Micaela Corn

PRODUCTION MANAGER
Chuck Dinsmore

CIRCULATION MANAGER
Andre Burton

OBITUARIES CONTRIBUTOR
Macy Levine, MD '43

EDITORIAL ADVISORS
Jeremy Berg, PhD
Michelle Broido, PhD
Nancy Davidson, MD
Paula Davis, MA
Joan Harvey, MD
David Kupfer, MD
Joan Lakoski, PhD
David Lewis, MD
Margaret C. McDonald, PhD, MFA
David Perlmutter, MD
Steven Shapiro, MD
Peter Strick, PhD
Ann Thompson, MD
Bennett Van Houten, PhD
Simon Watkins, PhD
Marshall Webster, MD, Res '70

UNIVERSITY COMMUNICATIONS
Kenneth Service
Cindy Gill

University of Pittsburgh

Pitt Med is published by the Office of the Dean and Senior Vice Chancellor for the Health Sciences in cooperation with the public affairs office. It is produced quarterly for alumni, students, staff, faculty, and friends of the School of Medicine. PR 6731

JOSHUA FRANZOS

When I look up in the universe, I know I'm small, but I'm also big. I'm big because I'm connected to the universe, and the universe is connected to me.

—Neil deGrasse Tyson

Quelle chance! We are not biologically autonomous: The company we keep includes 10,000 (and counting) species of microbes that inhabit our bodies. We have many more bugs in us, and on us, than we do our own cells. For the most part, the microorganisms that inhabit us are not pathogens; many are active contributors in the story of our physiology—as we are to theirs. (Don't miss this issue's "The Ecology Within" to find out what Pitt people are learning about this "microbiome.")

We walk around with 8 million microbial genes—more than 360 times as many as our "own" genes. Scientists refer to the DNA that makes up our microbiome as our "second genome." Its influence on our health rivals, and may even surpass, that of the DNA we inherited from our parents. (That first, inherited genome, our human genome, it should be noted, was cowritten by a committee of microbes—and likely continues to be. A great deal of our nuclear DNA comes from viruses, including oncogenes that drive cancer. Further, all of our mitochondrial DNA stems from a bacterium that was probably engulfed, long, long ago, by an archeal cell.) These organisms get into us, become a part of our biology, and then, may, as they leave us, take a piece of our biology with them. It's not unlike the relationship between pollinating insects and flowering plants; as a bee flies from flower to flower, it both collects and deposits pollen with each visit.

Humans play unwitting host to other company, as well. Motherhood is a peak time for cellular and molecular travelers. In pregnancy, cells pass through the placenta from the mother to the fetus and vice versa. In her first trimester, one of every 50,000 of the cells in her body is her child's. More plentiful are fragments of the fetus's genome floating in a mother's bloodstream; those fragments account for 6 percent of the total DNA in her plasma. (New noninvasive prenatal testing developed here at Pitt by David Peters and Aleksandar Rajkovic can detect certain fetal chromosome anomalies in a mother's blood.)

The number of fetal cells in a mother's blood climbs throughout pregnancy, then plummets after birth; but some stay for good, often founding colonies in organs throughout the mother's body. Animal studies have borne evidence that these cells, some of which are stem cells, can probably heal her skin, repair injuries in her heart, and even cross the blood-brain barrier to seed new neurons. Tissue from autopsies of women decades after they gave birth suggest that fetal cells may protect them from Alzheimer's disease and breast cancer.

One needn't become pregnant to benefit (or suffer) from microchimerism, this possession of cells that are both like us and "other." We carry cells from our mothers and, if we have them, likely from twins and older siblings. Nothing in nature is truly independent: As one pundit observed, "Things exist only insofar as they can be related to other things."

Fellow travelers, we are, at once, unique and derivative. There is a lesson here, writ large, for culture, the body politic, and all who inhabit our globe.

Arthur S. Levine, MD
Senior Vice Chancellor for the Health Sciences
John and Gertrude Petersen Dean, School of Medicine