

# YOUR BIONIC FUTURE

How technology will change the way you live in the next millennium

Fall 1999 Vol. 10, No. 3

## 4 Introduction

As life and technology merge, both will become more interesting.

## YOUR NEW BODY

### 6 Couture Cures: This Drug's for You

By Karen Hopkin

Doctors may one day sneak a peek at your genes to determine which drugs will cure you and which might kill you.

### 10 Growing New Organs

By David J. Mooney and Antonios G. Mikos

Semisynthetic, living organs could be used as replacement parts.

### 18 Embryonic Stem Cells for Medicine

By Roger A. Pedersen

Cells able to generate all other cell types have recently been isolated. They could help repair a wide variety of damaged tissues.

### 24 Head Transplants

By Robert J. White

Equipping old minds with new bodies is not beyond science.

### 27 Muscular Again

By Glenn Zorpette

A genetic vaccine will increase muscle mass—without exercise.

### 32 Making Methuselah

By Karen Hopkin

Immortality may not be in the cards, but worms, flies and pigeons may be able to teach us about living better for longer.



38

## YOUR NEW SENSES

### 38 Are You Ready for a New Sensation?

By Kathryn S. Brown

As biology meets engineering, scientists are designing the sensory experiences of a new tomorrow.

### 44 Feeling the Future

By Evelyn Strauss

Cybernetics will not only replace a lost sense of touch, it will also be able to enhance what we feel.

### 48 Getting Real in Cyberspace

By David Pescovitz

Virtual reality is not in suspended animation. Researchers are making advances in conveying the senses of smell and touch.

### 52 Nosing Out a Mate

By Meredith F. Small

All other mammals rely on chemical attractants to find that special someone. Will human suitors of the future be able to pack the power of pheromones?



32

# CONTENTS



## YOUR NEW MIND

### 56 **The Coming Merging of Mind and Machine** By Ray Kurzweil

The accelerating pace of technological progress means that our intelligent creations will soon eclipse us—and that their creations will eventually eclipse them.

### 62 **Tweaking the Genetics of Behavior** By Dean Hamer

How might new advances in behavioral genetics affect you and your children? A fictional couple plays design-a-baby.

## YOUR NEW LOOK

### 68 **When Off-the-Rack Becomes Off-the-Net** By Stephen Gray

Virtual-reality technology, the Internet and computer-aided manufacturing combine to bring custom clothing to your closet.

### 72 **Smart Stuff** By Kathryn S. Brown

The jewelry box of the future will include rings that remember your predilection for vanilla-flavored café au lait.

### 74 **What the Well-Dressed Warrior Will Wear** By Steve Nadis

Clothes that generate power and change appearance, new battlefield rations and tiny robotic scouts may assist the well-equipped soldier of the next century.

*Cover photograph by Zach Gold*

## YOUR NEW SOCIETY

### 76 **Will We Be One Nation, Indivisible?**

By Bruce Agnew

Racial tensions will ease and disparities will narrow, but experts disagree on whether racism will disappear even in 100 years.

### 80 **I, Clone**

By Ronald M. Green

Sometime soon, someone will create a cloned human being.

## YOUR NEW LIFESTYLE

### 84 **Living in Technology**

By Patrick Joseph

Electronic houses will make you feel at home.

### 88 **Future Feast**

By Jim Kling

Even the meat and potatoes are being reinvented: meat could come from a test tube, and potatoes could ward off cholera.

### 92 **The New Metropolis**

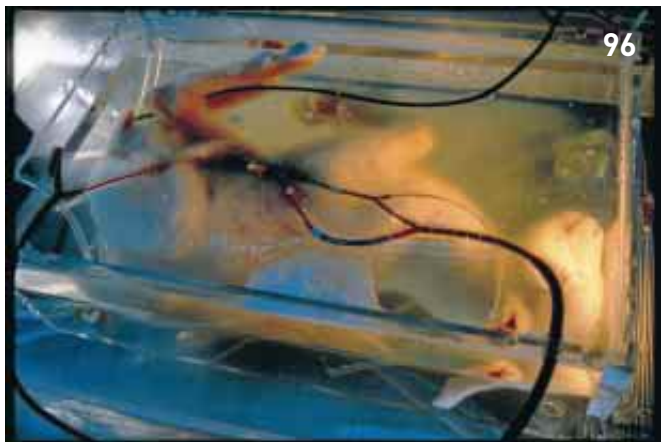
By Jim Kling

Can “new urbanism” be applied to urban America?

### 96 **The Ultimate Baby Bottle**

By Tabitha M. Powledge

Aldous Huxley was right. Artificial wombs are in our future.



### 100 **Future Schlock**

By Steve Mirsky

Prediction is fraught with peril, especially when it's about the future.

Scientific American Presents (ISSN 1048-0943), Volume 10, Number 3, Fall 1999, published quarterly by Scientific American, Inc., 415 Madison Avenue, New York, NY 10017-1111. Copyright © 1999 by Scientific American, Inc. All rights reserved. No part of this issue may be reproduced by any mechanical, photographic or electronic process, or in the form of a phonographic recording, nor may it be stored in a retrieval system, transmitted or otherwise copied for public or private use without written permission of the publisher. Periodicals Publication Rate. Postage paid at New York, N.Y., and at additional mailing offices. Canadian B.N. No. 127387652RT, QST No. Q1015332537. Subscription rates: one year \$19.80 (outside U.S. \$23.80). To purchase additional quantities: 1 to 9 copies: U.S. \$5.95 each plus \$2.00 per copy for postage and handling (outside U.S. \$5.00 P&H); 10 to 49 copies: U.S. \$5.35 each, postpaid; 50 copies or more: U.S. \$4.75 each, postpaid. Send payment to Scientific American, Dept. SAQ, 415 Madison Avenue, New York, NY 10017-1111. Postmaster: Send address changes to Scientific American Presents, Box 5063, Harlan, IA 51593. Subscription inquiries: U.S. and Canada (800) 333-1199; other (515) 247-7631.