Saving Lives with Biomedical Research

Published by the Oregon National Primate Research Center/Oregon Health & Science University

Beaverton, OR 97006

First edition, July 2007

Design and illustrations by Andrea Fitcha

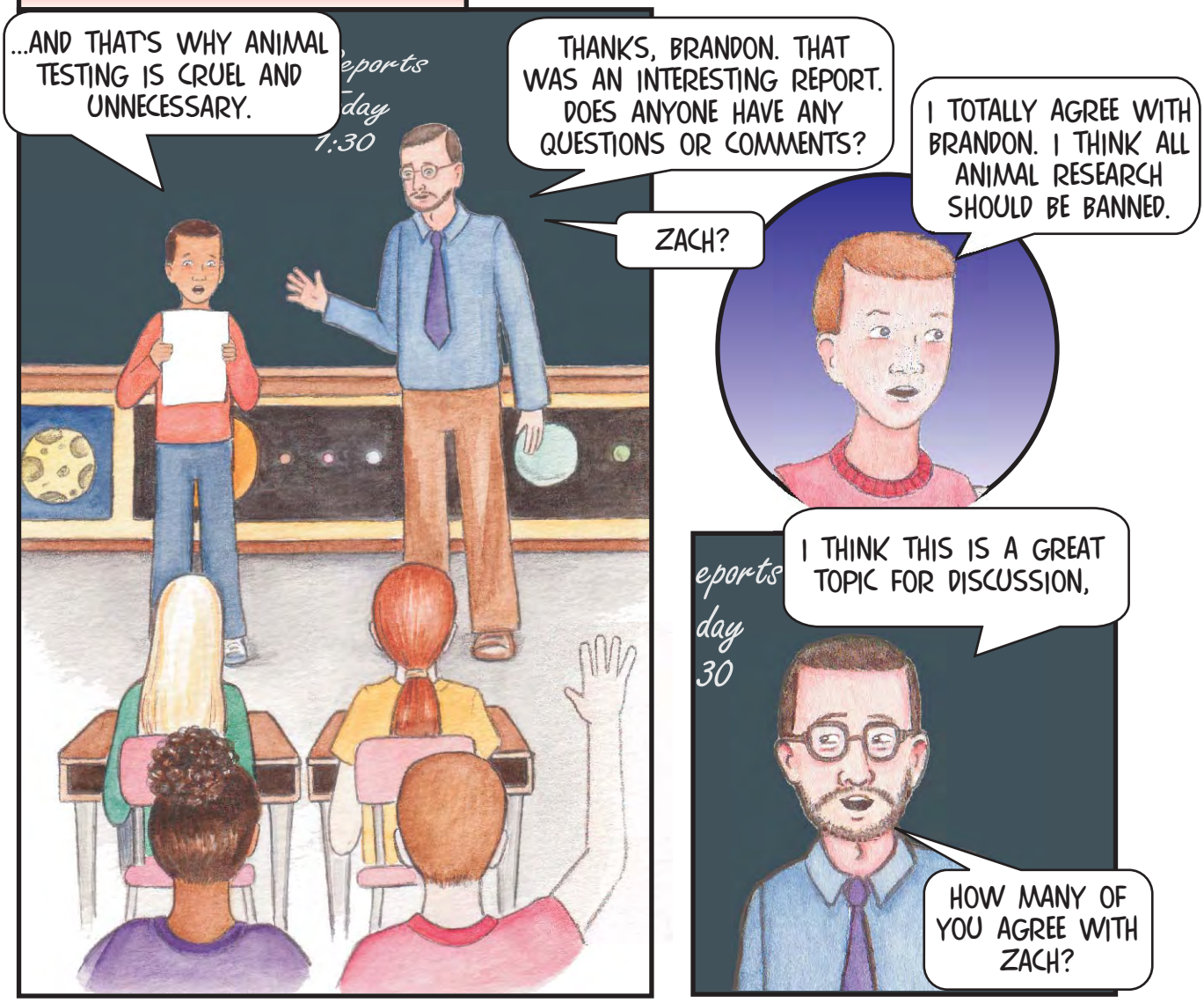
MEET MEGAN, ZACH, & MAX

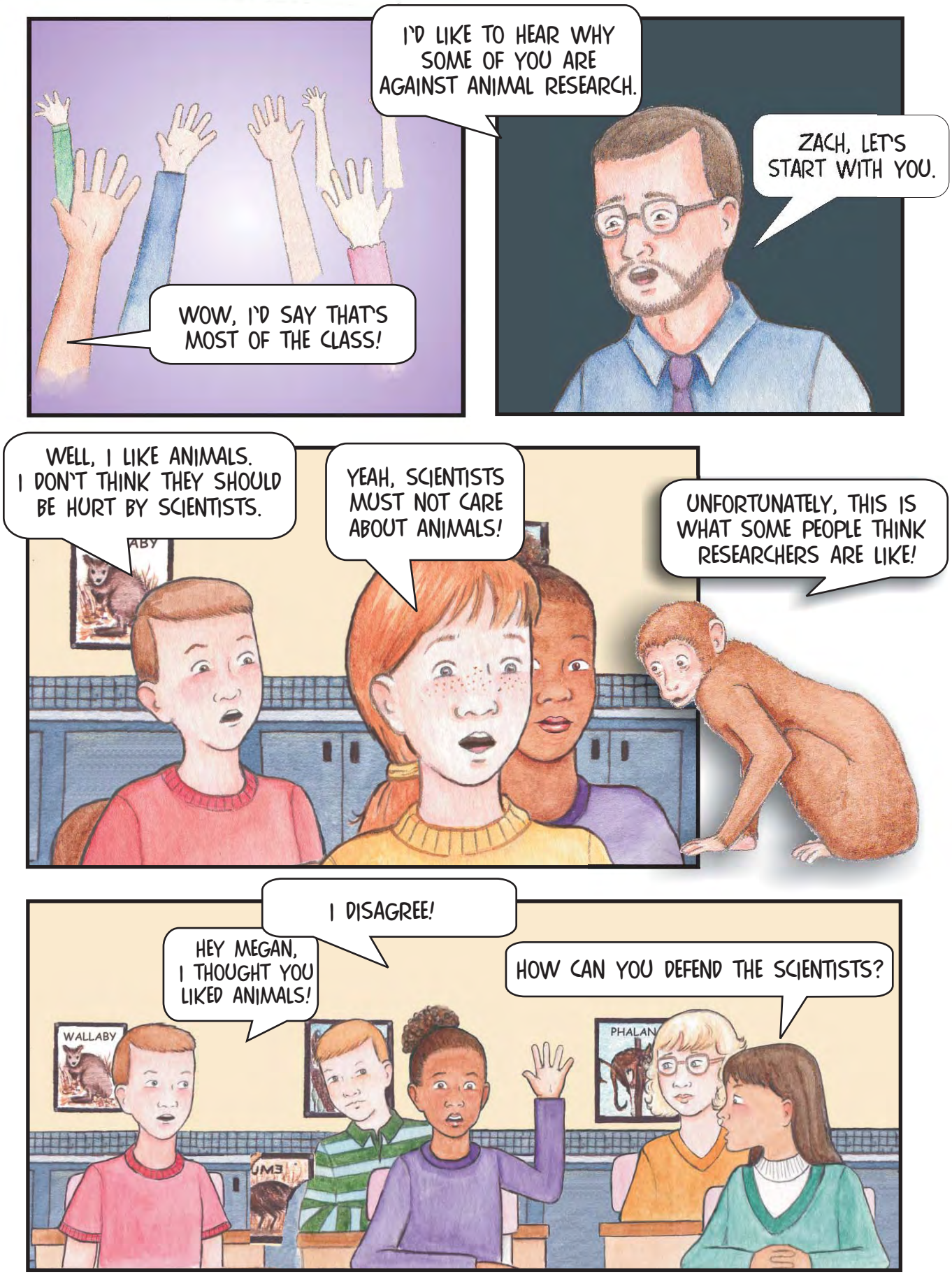
MEGAN WANTS TO BE A REPORTER WHEN SHE GROWS UP. SHE ALWAYS HAS A NOTEBOOK HANDY JUST IN CASE SHE FINDS A GOOD STORY.

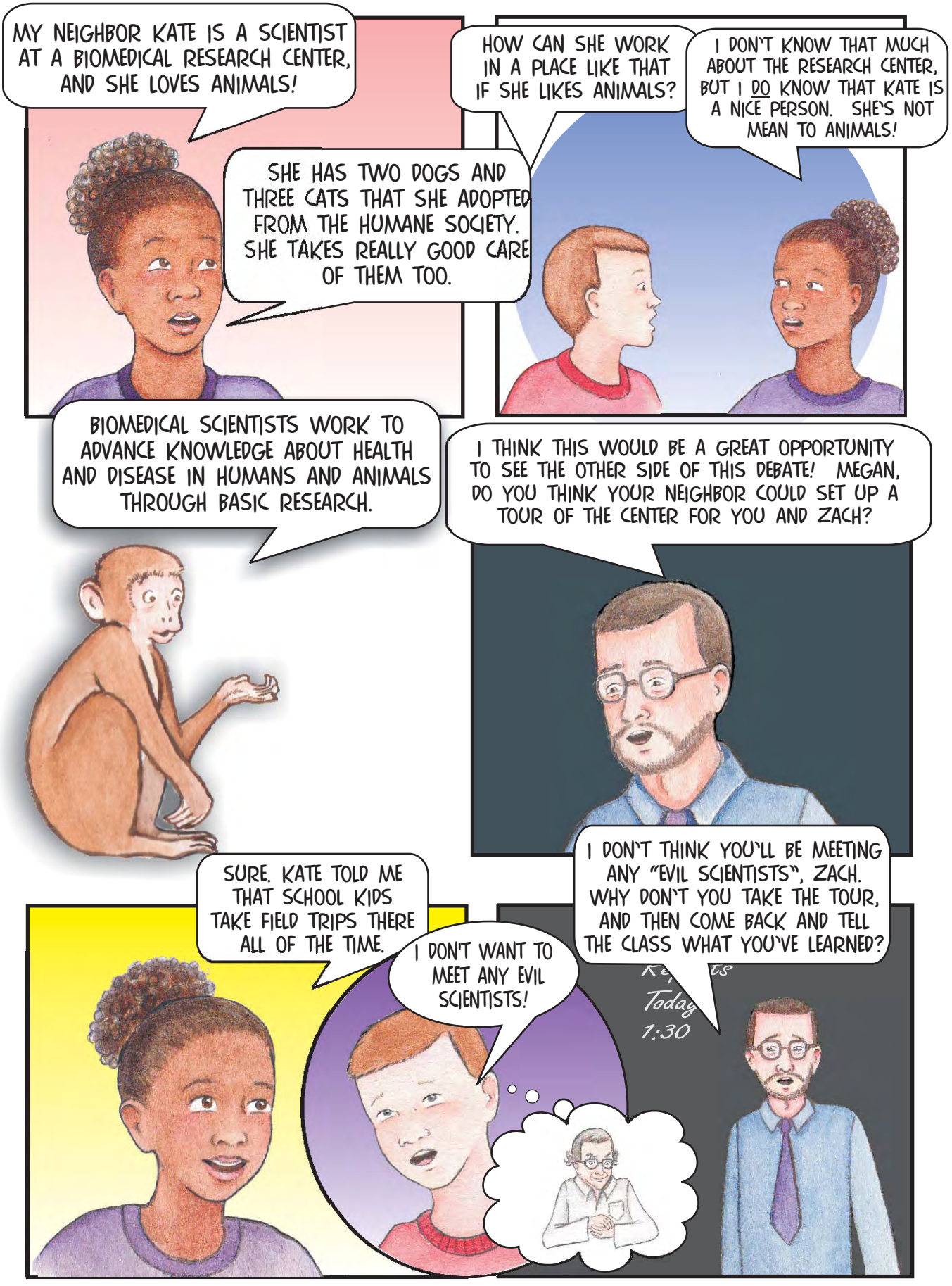
ZACH WANTS TO WORK WITH ANIMALS SOME DAY. HE ALSO LOVES TO LOOK UP FACTS ON HIS COMPUTER.

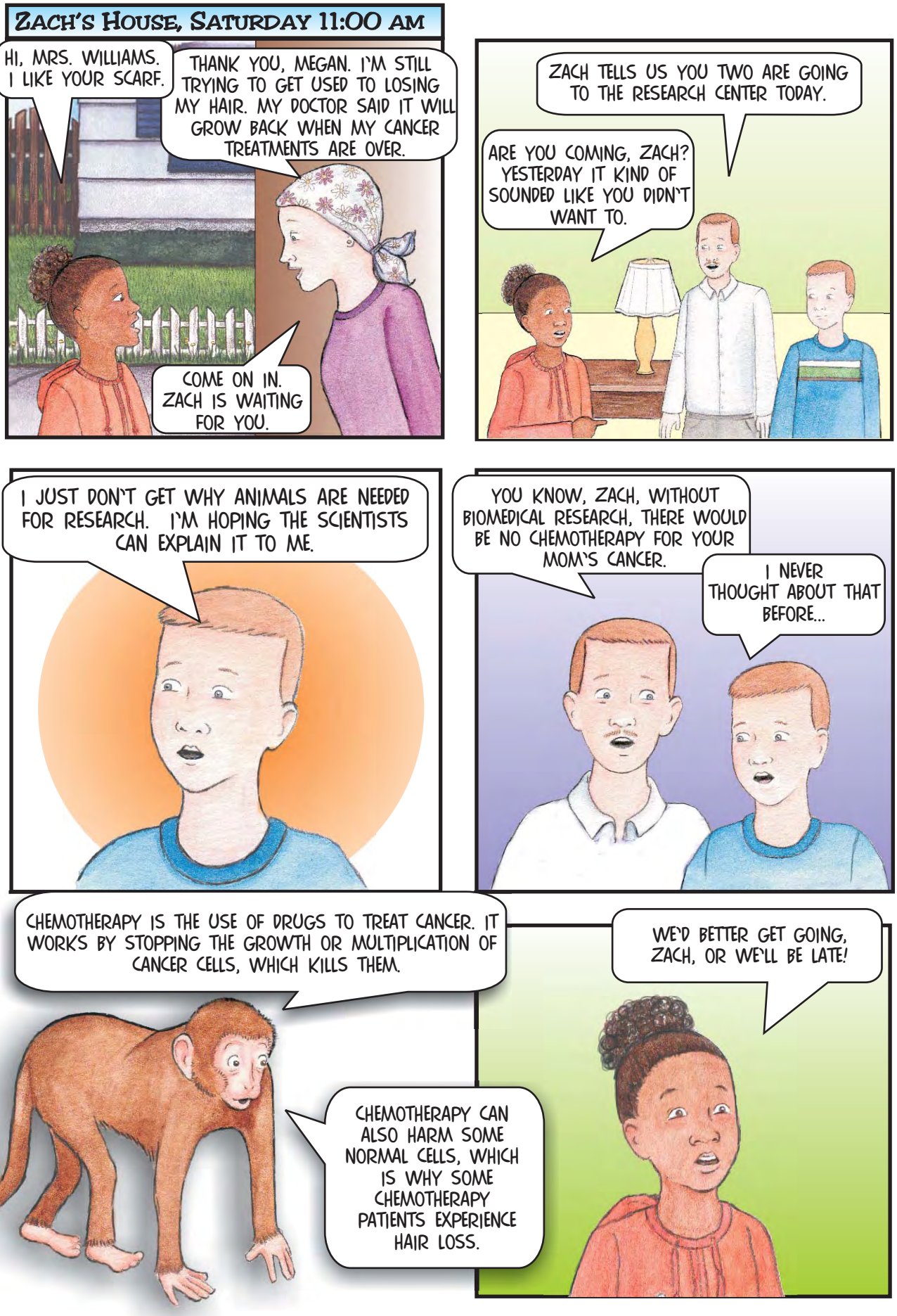
MAX IS A MACAQUE. (PRONOUNCED MA-**KAK**) HE'LL BE YOUR GUIDE IN THIS BOOK.

MONDAY AFTERNOON 1:45 PM




I'D LIKE TO HEAR WHY SOME OF YOU ARE AGAINST ANIMAL RESEARCH.
ZACH, LET'S START WITH YOU.
WOW, I'D SAY THAT'S MOST OF THE CLASS!
WELL, I LIKE ANIMALS. I DON'T THINK THEY SHOULD BE HURT BY SCIENTISTS.
YEAH, SCIENTISTS MUST NOT CARE ABOUT ANIMALS!
UNFORTUNATELY, THIS IS WHAT SOME PEOPLE THINK RESEARCHERS ARE LIKE!
I DISAGREE!
HEY MEGAN, I THOUGHT YOU LIKED ANIMALS!
HOW CAN YOU DEFEND THE SCIENTISTS?
WALLABY


MY NEIGHBOR KATE IS A SCIENTIST AT A BIOMEDICAL RESEARCH CENTER, AND SHE LOVES ANIMALS!
SHE HAS TWO DOGS AND THREE CATS THAT SHE ADOPTED FROM THE HUMANE SOCIETY. SHE TAKES REALLY GOOD CARE OF THEM TOO.
HOW CAN SHE WORK IN A PLACE LIKE THAT IF SHE LIKES ANIMALS?
I DON'T KNOW THAT MUCH ABOUT THE RESEARCH CENTER, BUT I DO KNOW THAT KATE IS A NICE PERSON. SHE'S NOT MEAN TO ANIMALS!
BIOMEDICAL SCIENTISTS WORK TO ADVANCE KNOWLEDGE ABOUT HEALTH AND DISEASE IN HUMANS AND ANIMALS THROUGH BASIC RESEARCH.
I THINK THIS WOULD BE A GREAT OPPORTUNITY TO SEE THE OTHER SIDE OF THIS DEBATE! MEGAN, DO YOU THINK YOUR NEIGHBOR COULD SET UP A TOUR OF THE CENTER FOR YOU AND ZACH?
SURE. KATE TOLD ME THAT SCHOOL KIDS TAKE FIELD TRIPS THERE ALL OF THE TIME.
I DON'T WANT TO MEET ANY EVIL SCIENTISTS!
I DON'T THINK YOU'LL BE MEETING ANY "EVIL SCIENTISTS", ZACH. WHY DON'T YOU TAKE THE TOUR, AND THEN COME BACK AND TELL THE CLASS WHAT YOU'VE LEARNED?
Today
1:30

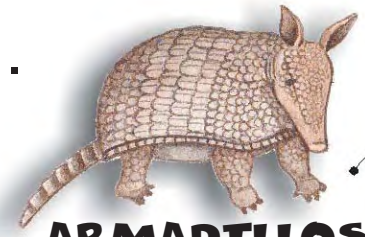

ZACH'S HOUSE, SATURDAY 11:00 AM
HI, MRS. WILLIAMS. I LIKE YOUR SCARF.
THANK YOU, MEGAN. I'M STILL TRYING TO GET USED TO LOSING MY HAIR. MY DOCTOR SAID IT WILL GROW BACK WHEN MY CANCER TREATMENTS ARE OVER.
COME ON IN. ZACH IS WAITING FOR YOU.
ZACH TELLS US YOU TWO ARE GOING TO THE RESEARCH CENTER TODAY.
ARE YOU COMING, ZACH? YESTERDAY IT KIND OF SOUNDED LIKE YOU DIDN'T WANT TO.
I JUST DON'T GET WHY ANIMALS ARE NEEDED FOR RESEARCH. I'M HOPING THE SCIENTISTS CAN EXPLAIN IT TO ME.
YOU KNOW, ZACH, WITHOUT BIOMEDICAL RESEARCH, THERE WOULD BE NO CHEMOTHERAPY FOR YOUR MOM'S CANCER.
I NEVER THOUGHT ABOUT THAT BEFORE...
CHEMOTHERAPY IS THE USE OF DRUGS TO TREAT CANCER. IT WORKS BY STOPPING THE GROWTH OR MULTIPLICATION OF CANCER CELLS, WHICH KILLS THEM.
CHEMOTHERAPY CAN ALSO HARM SOME NORMAL CELLS, WHICH IS WHY SOME CHEMOTHERAPY PATIENTS EXPERIENCE HAIR LOSS.
WE'D BETTER GET GOING, ZACH, OR WE'LL BE LATE!

ANIMALS NEEDED IN RESEARCH

Although 90-95% of animals needed in research are rats and mice, sometimes different animals are required. From armadillos to slugs, different animals can teach us different things about our bodies and how diseases affect them.

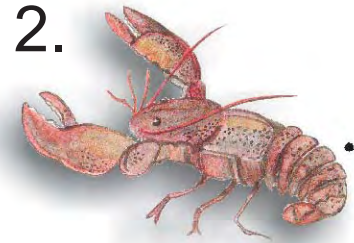
Can you guess which animal has taught us about which diseases? Trace the line from each animal to its book to find out.

1.



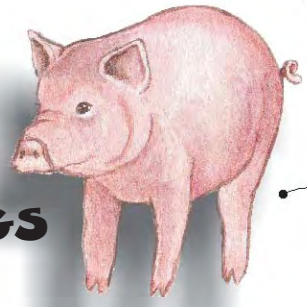
ARMADILLOS

2.



LOBSTERS

3.



PIGS

4.

ELECTRIC EELS

5.

FERRETS

6.

RABBITS

a. BURN TREATMENTS, HEART VALVE REPLACEMENTS, THE CT SCAN

b. PARKINSON'S DISEASE, HUNTINGTON'S CHOREA, AND OTHER MOTOR COORDINATION DISEASES.

c. CORNEAL TRANSPLANTS, CANCER, EAR INFECTIONS

d. STUDIES OF THE NERVOUS SYSTEM

e. VACCINE FOR LEPROSY

f. STUDIES OF THE INFLUENZA VIRUS (THE FLU)


A FEW MINUTES LATER...
THERE'S THE PLACE!
BIOMEDICAL REASERCH CENTER
YOU MUST BE MEGAN AND ZACH! I'M CAROL. KATE ASKED ME TO SHOW YOU AROUND.
HELLO.
HI.
SEE, SHE'S NOT MEAN.
SHE'S PROBABLY JUST HAVING A GOOD DAY.
I'M GLAD BOTH OF YOU COULD COME TODAY. I'LL GIVE YOU A TOUR OF THE CENTER, AND YOU CAN MEET SOME OF OUR RESEARCHERS.
O.K.
MANY RESEARCH CENTERS HAVE RESOURCES AVAILABLE TO THE PUBLIC. WEBSITES ARE KEPT UP TO DATE WITH THE LATEST SCIENTIFIC DISCOVERIES, AND TOURS LET THE PUBLIC LEARN MORE ABOUT ANIMALS AND HOW THEY HELP WITH BIOMEDICAL RESEARCH.
THIS IS ONE OF THE PLACES OUR MONKEYS LIVE. IT'S CALLED AN OPEN-AIR SHELTER.
WOW, IT'S SO BIG!
SO THE MONKEYS LIVE IN GROUPS HERE?

ANIMAL CARE

At Primate Research Centers, monkeys that are needed for scientific research are cared for by highly trained staff. Besides providing basic needs such as food and health care, laboratory animals are cared for in other ways. Researchers know that working with animals is a privilege, and that they deserve the best of care. They also know that their scientific findings may not be accurate if the animals are not healthy and well-cared for.

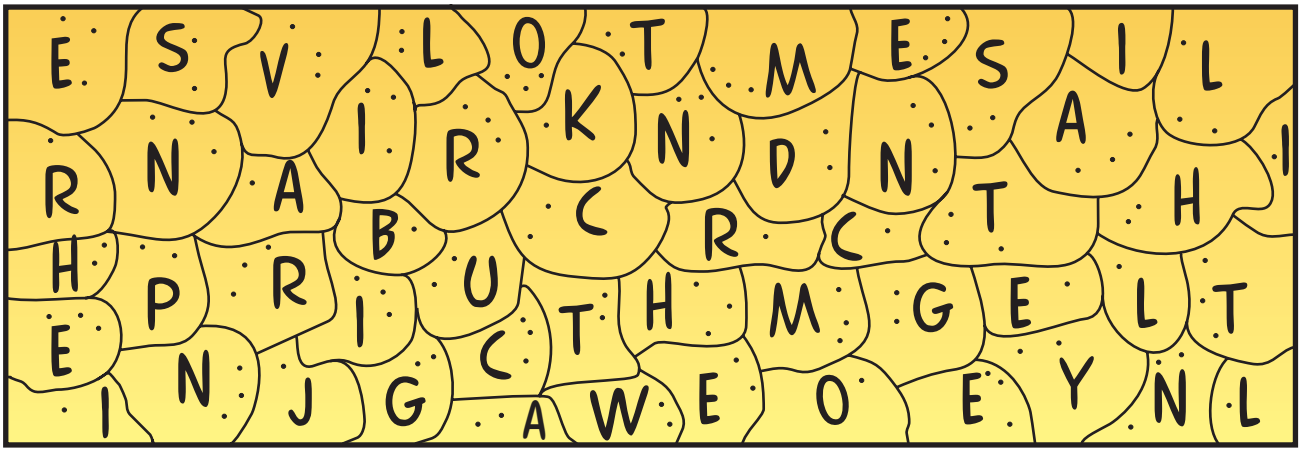
In the wild, monkeys spend up to 70% of their days searching for food. This is called foraging. At Primate Centers, monkeys don't have to forage. In order to provide a similar experience for them, they are given a variety of puzzles and toys that have food inside.

Monkeys, like people, seem to like just playing around. Climbing structures, swings, toys, and swimming pools provide play opportunities for the monkeys at the primate center.

In addition to their normal diet, monkeys are provided with a variety of healthy treats, including fruits, vegetables, and trail mix.

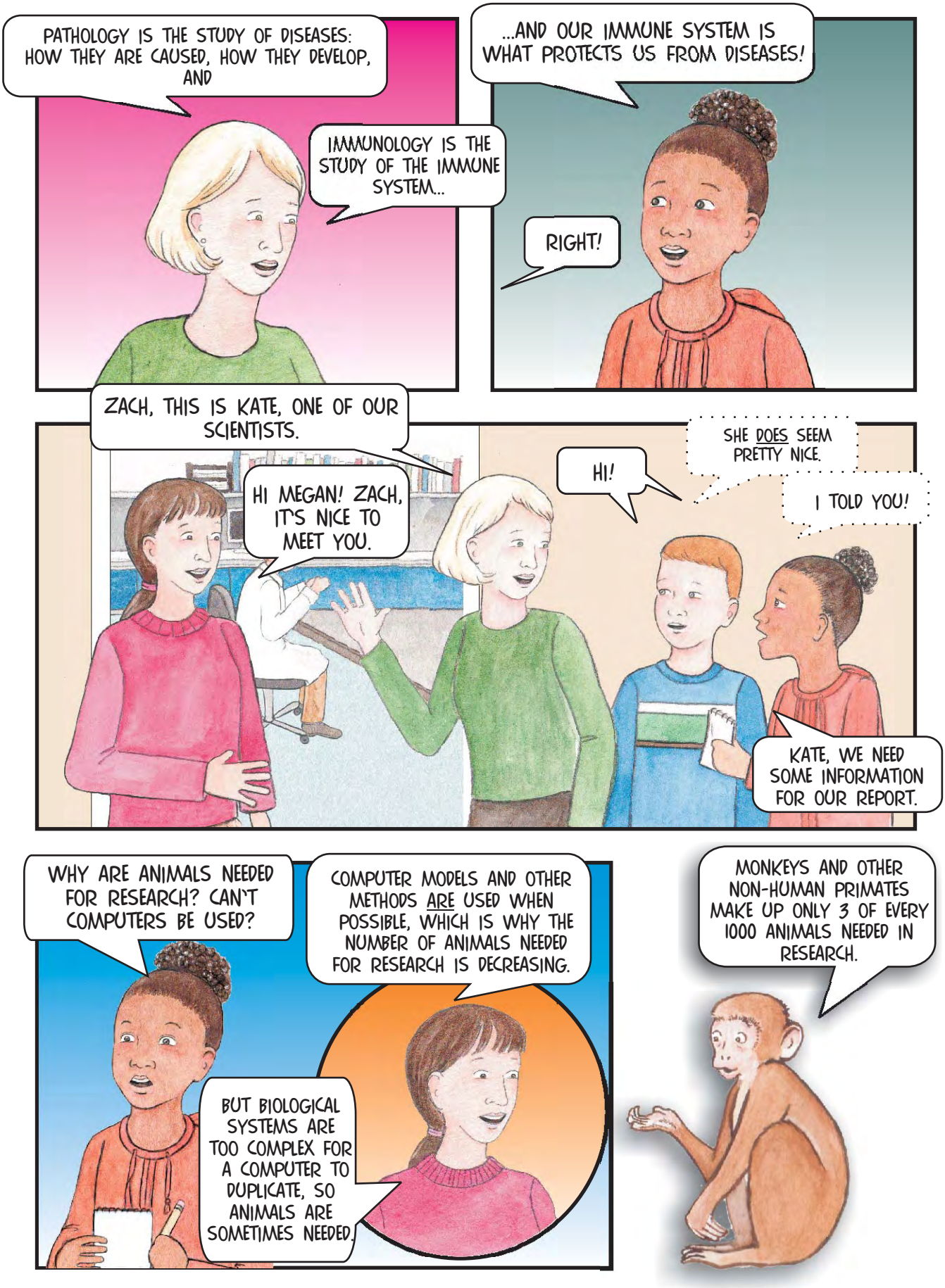
Positive reinforcement training (training with treats and praise) is used to train monkeys to do certain behaviors that are important for their care or for scientific reasons. Monkeys learn quickly and seem to enjoy interaction with people.

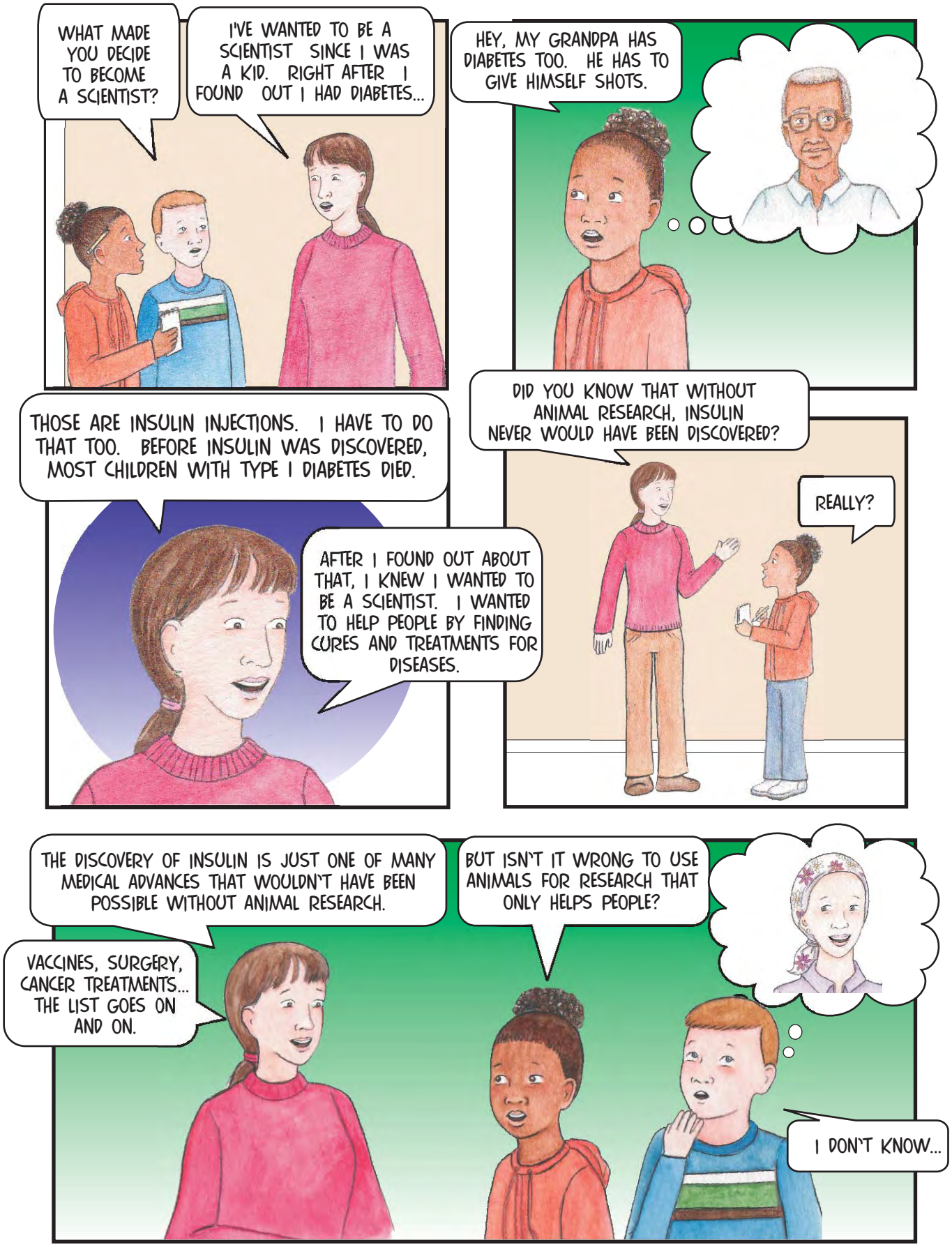
MONKEYS ARE INTELLIGENT, SOCIAL ANIMALS THAT NEED SPECIAL CARE TO KEEP THEM ENTERTAINED AND INTERESTED. TO FIND OUT THE TWO-WORD PHRASE THAT DESCRIBES THIS SPECIAL CARE, SHADE IN THE AREAS WITH 3 DOTS, AND WRITE THE LETTERS IN THOSE AREAS ON THE SPACES BELOW.



_____ _____


THIS IS DR. ESPINOSA, ONE OF THE VETERINARIANS WE HAVE ON STAFF..
YOU'RE AN AN ANIMAL DOCTOR?
YES.
I'M ACTUALLY ONE OF EIGHT VETERINARIANS THAT WORK HERE. WE ALSO HAVE OVER 80 STAFF MEMBERS TO HELP US.
SO YOUR JOB IS TO KEEP THE ANIMALS HEALTHY?
YES. WE PROVIDE THEM WITH HEALTH CARE 24 HOURS A DAY.
BECAUSE OF THE EXCELLENT HEALTH CARE PRIMATE CENTERS PROVIDE, MONKEYS CAN LIVE TO BE 25-30 YEARS OLD, MUCH LONGER THAN THOSE IN THE WILD USUALLY LIVE.
WOULD YOU LIKE TO SEE ONE OF OUR LABS?
SURE.
THIS IS THE PATHOBIOLOGY AND IMMUNOLOGY LABORATORY.
I KNEW I SHOULD HAVE BROUGHT MY DICTIONARY!
THIS IS THE LAB THAT KATE WORKS IN!

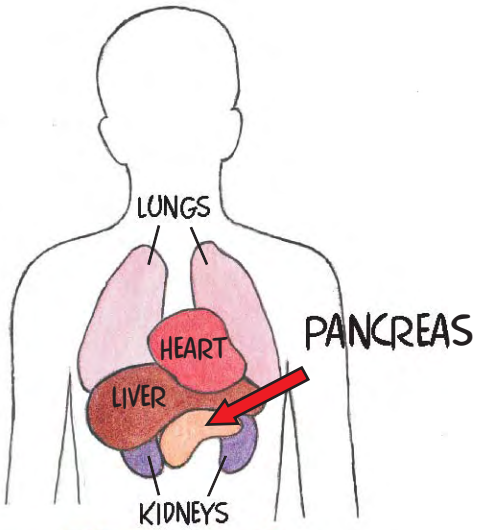

PATHOLOGY IS THE STUDY OF DISEASES: HOW THEY ARE CAUSED, HOW THEY DEVELOP, AND
IMMUNOLOGY IS THE STUDY OF THE IMMUNE SYSTEM...
...AND OUR IMMUNE SYSTEM IS WHAT PROTECTS US FROM DISEASES!
RIGHT!
ZACH, THIS IS KATE, ONE OF OUR SCIENTISTS.
HI MEGAN! ZACH, IT'S NICE TO MEET YOU.
HI!
SHE DOES SEEM PRETTY NICE.
I TOLD YOU!
KATE, WE NEED SOME INFORMATION FOR OUR REPORT.
WHY ARE ANIMALS NEEDED FOR RESEARCH? CAN'T COMPUTERS BE USED?
COMPUTER MODELS AND OTHER METHODS ARE USED WHEN POSSIBLE, WHICH IS WHY THE NUMBER OF ANIMALS NEEDED FOR RESEARCH IS DECREASING.
BUT BIOLOGICAL SYSTEMS ARE TOO COMPLEX FOR A COMPUTER TO DUPLICATE, SO ANIMALS ARE SOMETIMES NEEDED.
MONKEYS AND OTHER NON-HUMAN PRIMATES MAKE UP ONLY 3 OF EVERY 1000 ANIMALS NEEDED IN RESEARCH.

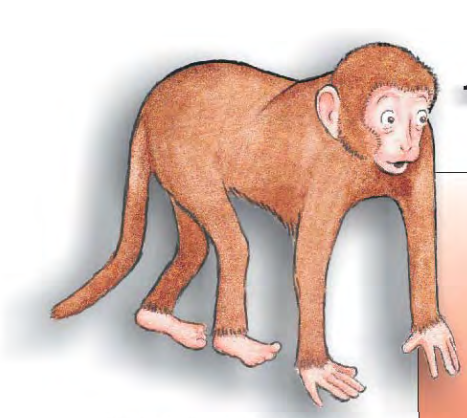

WHAT MADE YOU DECIDE TO BECOME A SCIENTIST?
I'VE WANTED TO BE A SCIENTIST SINCE I WAS A KID. RIGHT AFTER I FOUND OUT I HAD DIABETES...
HEY, MY GRANDPA HAS DIABETES TOO. HE HAS TO GIVE HIMSELF SHOTS.
DID YOU KNOW THAT WITHOUT ANIMAL RESEARCH, INSULIN NEVER WOULD HAVE BEEN DISCOVERED?
REALLY?
THOSE ARE INSULIN INJECTIONS. I HAVE TO DO THAT TOO. BEFORE INSULIN WAS DISCOVERED, MOST CHILDREN WITH TYPE 1 DIABETES DIED.
AFTER I FOUND OUT ABOUT THAT, I KNEW I WANTED TO BE A SCIENTIST. I WANTED TO HELP PEOPLE BY FINDING CURES AND TREATMENTS FOR DISEASES.
THE DISCOVERY OF INSULIN IS JUST ONE OF MANY MEDICAL ADVANCES THAT WOULDN'T HAVE BEEN POSSIBLE WITHOUT ANIMAL RESEARCH.
BUT ISN'T IT WRONG TO USE ANIMALS FOR RESEARCH THAT ONLY HELPS PEOPLE?
VACCINES, SURGERY, CANCER TREATMENTS... THE LIST GOES ON AND ON.
I DON'T KNOW...

WHAT IS DIABETES?

Food is fuel for your body, just like gas is fuel for a car. In a healthy body, the PANCREAS (an organ located behind the stomach) makes INSULIN. Insulin lets your body turn food into fuel.

When someone has diabetes, it means that their pancreas isn't making enough insulin, or their body isn't using insulin properly. This means that a lot of diabetics have to get insulin another way, usually through injections.





TYPE 1

IS ALSO CALLED INSULIN-DEPENDENT, OR JUVENILE DIABETES. MOST PEOPLE WITH THIS TYPE ARE DIAGNOSED WHEN THEY ARE UNDER THE AGE OF 30. WITH THIS TYPE OF DIABETES, A PERSON'S PANCREAS EITHER MAKES VERY LITTLE INSULIN, OR NONE AT ALL. ABOUT 10% OF PEOPLE WITH DIABETES HAVE TYPE 1.

TYPE 2

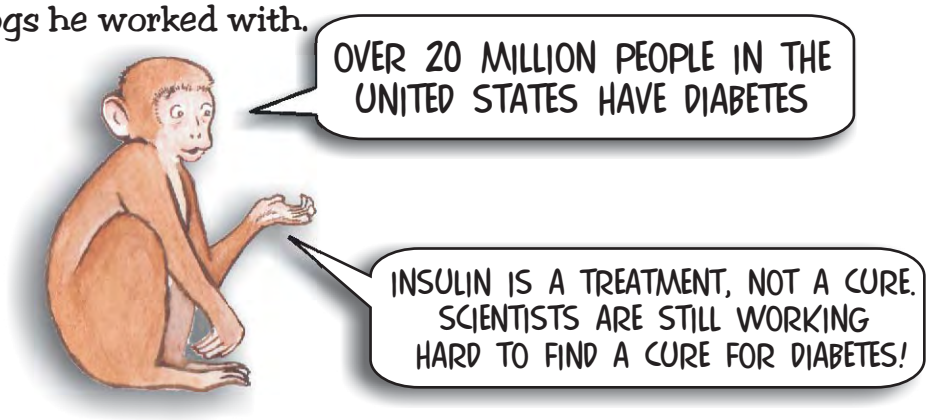
IS THE MOST COMMON FORM OF DIABETES, AND IT IS ON THE RISE. IT IS USUALLY DIAGNOSED IN ADULTS OVER THE AGE OF 35, ESPECIALLY IN THOSE WHO ARE OVERWEIGHT. HOWEVER, THE NUMBER OF CHILDREN AND TEENAGERS WITH TYPE 2 HAS INCREASED RECENTLY, AS MORE AND MORE OF THEM ARE BECOMING OVERWEIGHT. ABOUT 90% OF PEOPLE WITH DIABETES HAVE TYPE 2. MANY PEOPLE WITH TYPE 2 DIABETES USE INSULIN.

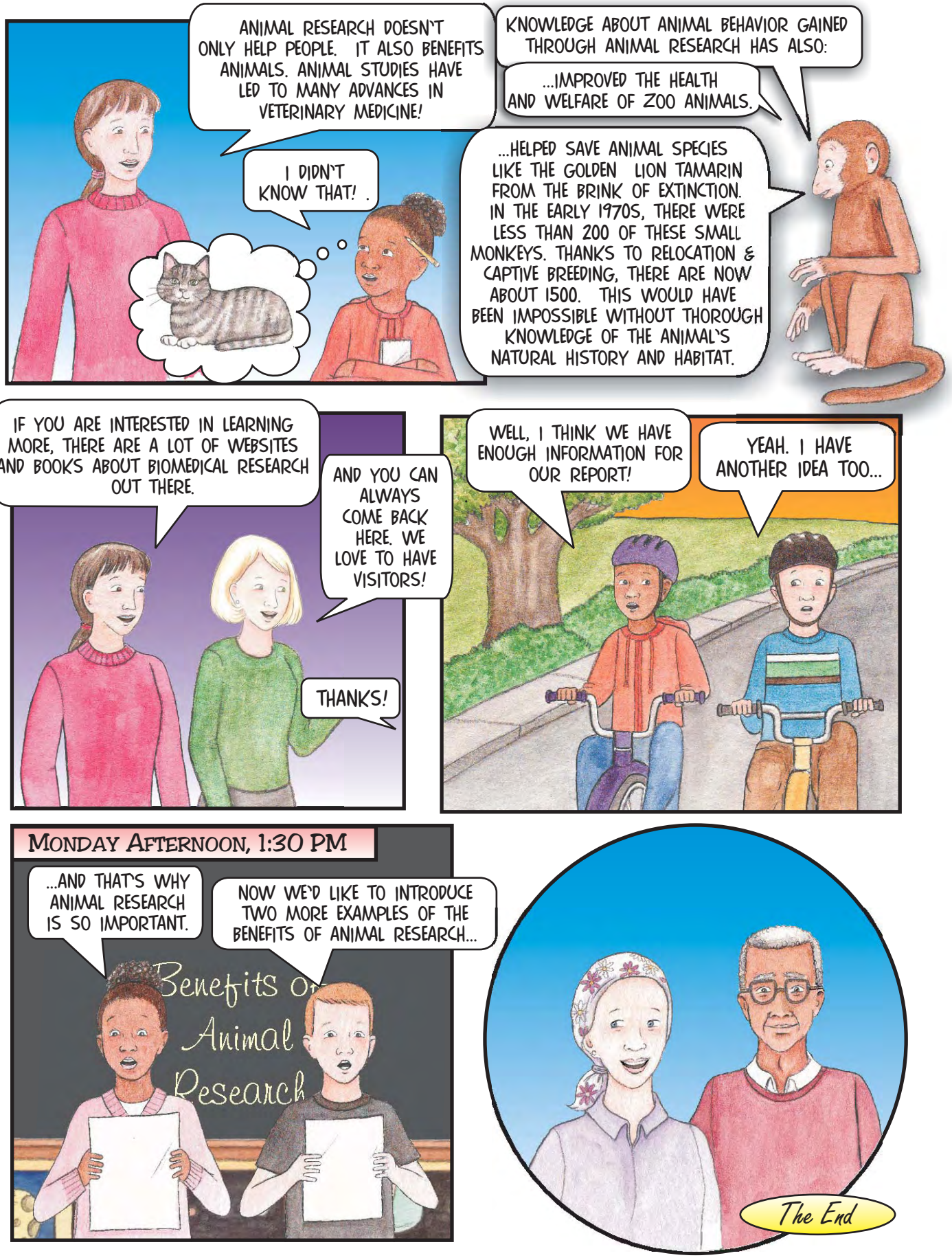
BEFORE INSULIN WAS DISCOVERED IN THE 1920S, MOST TYPE 1 DIABETICS DIED. THERE WAS NO OTHER TREATMENT AVAILABLE.

FREDERICK BANTING was one of the scientists who discovered insulin. He found it in dog pancreases.

SIR FREDERICK BANTING (1891 - 1941)

Like all good researchers, Banting cared for the animals he worked with. He kept the dogs' pens very clean, and played with them often. He became very attached to the dogs he worked with.



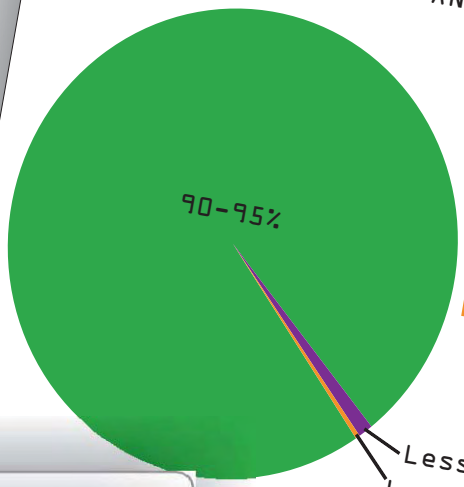

ANIMAL RESEARCH DOESN'T ONLY HELP PEOPLE. IT ALSO BENEFITS ANIMALS. ANIMAL STUDIES HAVE LED TO MANY ADVANCES IN VETERINARY MEDICINE!
I DIDN'T KNOW THAT!
KNOWLEDGE ABOUT ANIMAL BEHAVIOR GAINED THROUGH ANIMAL RESEARCH HAS ALSO:
...IMPROVED THE HEALTH AND WELFARE OF ZOO ANIMALS.
...HELPED SAVE ANIMAL SPECIES LIKE THE GOLDEN LION TAMARIN FROM THE BRINK OF EXTINCTION. IN THE EARLY 1970S, THERE WERE LESS THAN 200 OF THESE SMALL MONKEYS. THANKS TO RELOCATION & CAPTIVE BREEDING, THERE ARE NOW ABOUT 1500. THIS WOULD HAVE BEEN IMPOSSIBLE WITHOUT THOROUGH KNOWLEDGE OF THE ANIMAL'S NATURAL HISTORY AND HABITAT.
IF YOU ARE INTERESTED IN LEARNING MORE, THERE ARE A LOT OF WEBSITES AND BOOKS ABOUT BIOMEDICAL RESEARCH OUT THERE.
AND YOU CAN ALWAYS COME BACK HERE. WE LOVE TO HAVE VISITORS!
THANKS!
WELL, I THINK WE HAVE ENOUGH INFORMATION FOR OUR REPORT!
YEAH. I HAVE ANOTHER IDEA TOO...
MONDAY AFTERNOON, 1:30 PM
...AND THAT'S WHY ANIMAL RESEARCH IS SO IMPORTANT.
NOW WE'D LIKE TO INTRODUCE TWO MORE EXAMPLES OF THE BENEFITS OF ANIMAL RESEARCH...
Benefits of Animal Research
The End

ANIMAL RESEARCH STATISTICS
by Zach

In 2001, 1,236,903 animals were needed for research in the United States. This number doesn't include mice and rats.

Because of new technology and computer models, the number of animals needed for research has dropped by as much as 50% since 1970.

SPECIES NEEDED FOR ANIMAL RESEARCH



www.kids4research.org

DISEASES IN THE UNITED STATES
by Megan

DIABETES

20.8 million children and adults in the United States (7% of the population) have diabetes.

14.6 million are diagnosed, and 6.2 million are undiagnosed.

54 million people have pre-diabetes.

CANCER

There were an estimated 1,444,920 new cancer cases in 2007.

DEPRESSION

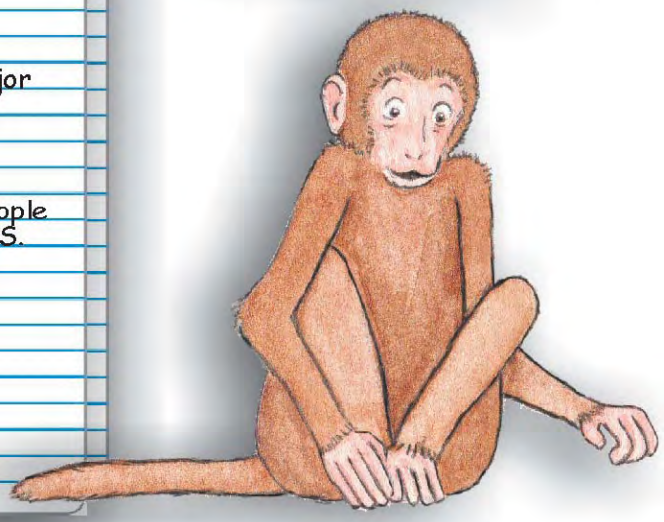
35 to 40 million Americans will suffer from major depression during their lives.

HIV/AIDS

At the end of 2003, 1,039,000 to 1,185,000 people in the United States were living with HIV/AIDS. 24-27% of these people were undiagnosed and unaware of their HIV infection.

Without animal research, treatments for these diseases would remain unknown.

IT'S A GOOD IDEA TO USE MORE THAN ONE SOURCE WHEN YOU'RE DOING RESEARCH. THERE ARE A LOT OF BOOKS, MAGAZINES & WEBSITES TO CHOOSE FROM!



ANIMALS HELPING ANIMALS

Animal testing benefits people, but did you know that it helps other animals? Follow the path from the macaque through each of the advances in veterinary medicine, and end at the pets.

VACCINES
prevent your pet from contracting rabies, leukemia, distemper, and other diseases

CHEMOTHERAPY
kills cancer cells in animals just like it does for people

PAIN RELIEVERS
prevent your pet's pain and discomfort when he's sick or hurt.

SURGERY
New techniques in veterinary surgery saves many pets' lives

ANTIBIOTICS
treat and prevent your pet's infections.

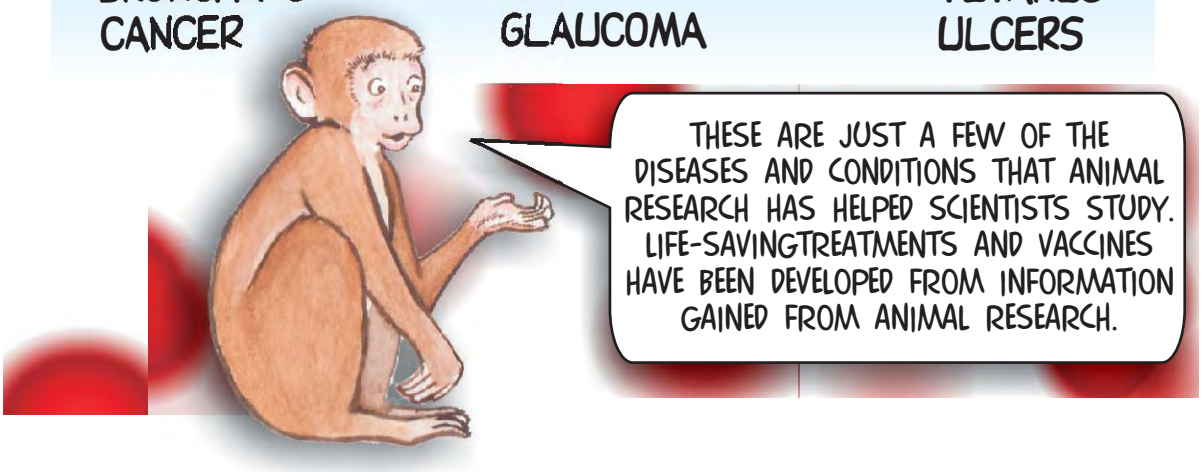
DID YOU KNOW?

In 2001, Dr. Theresa Fossum performed heart surgery on Luke, a two-year-old Golden Retriever. Without the surgery, Luke wouldn't have survived to see his third birthday.. Animal research made that surgery possible.

DISEASES RESEARCHED

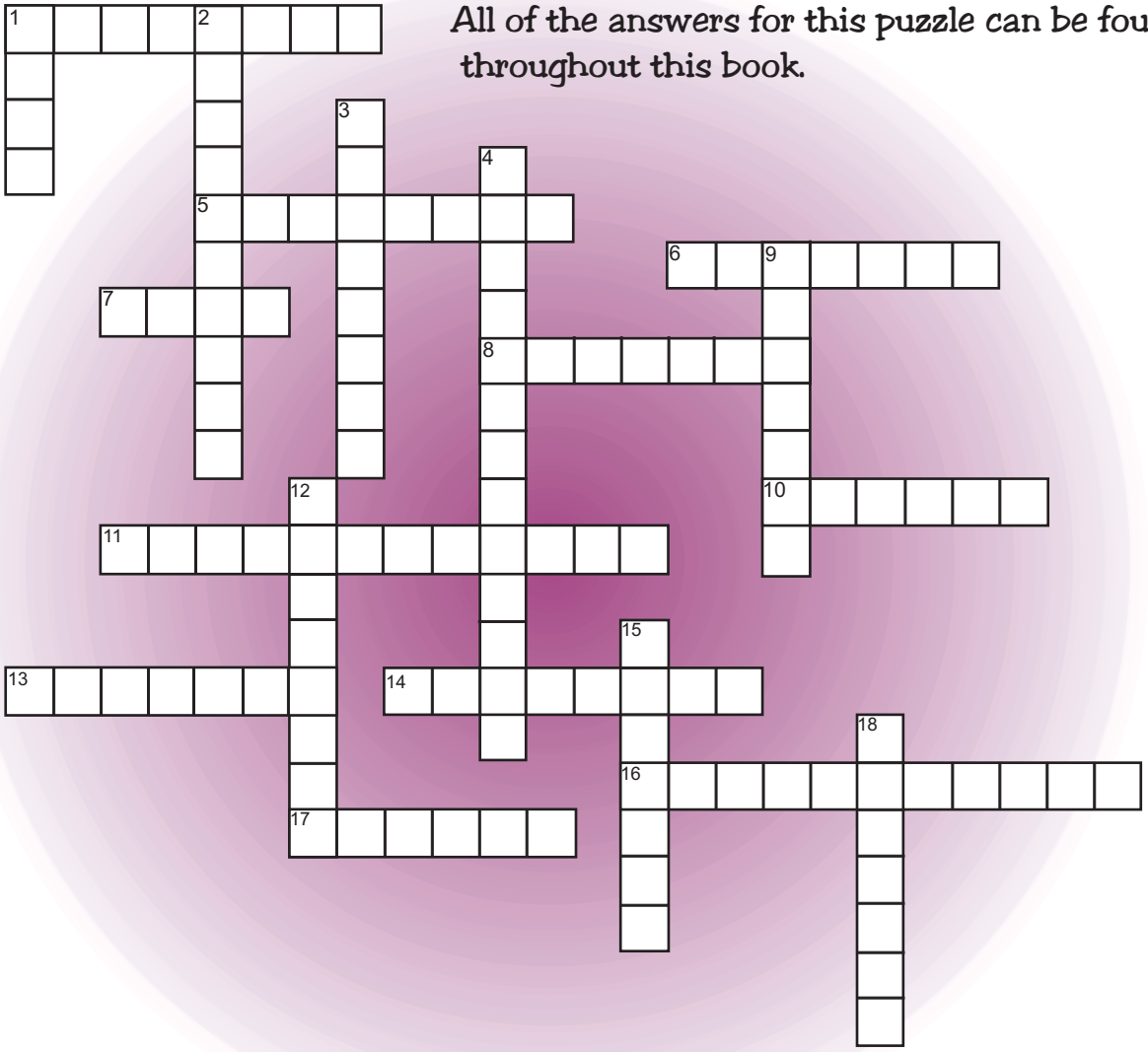
A R T H R I T I S X J L O E M T R
S L N F B I R T H D E F E C T S B
T R L B O P Q Y J T Z O X D I W R
H U B E G M U M P S E D H E S Q O
M B C E R J E E H T O T J A W N N
A E A D L G L A U C O M A F O S C
U L X J D L I L S D E M T N R C H
P L E C K B C E R L Q A F E U E I
T A C R A X E R S A E J P S A S T
Q G P E L N P G F G Q S H S H B I
P A U Q R L C L D D I A B E T E S
O M I J H S K E L E P I L E P S Y
L Z G E E O N R R O V A Y W G K Q
I C Y S T I C F I B R O S I S V F
O D I P T H E R I A A R T J O P C

ALLERGIES
ARTHRITIS
ASTHMA
BIRTH DEFECTS
BRONCHITIS
CANCER
CYSTIC FIBROSIS
DEAFNESS
DIABETES
DIPTHERIA
EPILEPSY
GLAUCOMA
MEASLES
MUMPS
POLIO
RUBELLA
TETANUS
ULCERS



Animal Research Crossword

All of the answers for this puzzle can be found throughout this book.



ACROSS

1. Monkeys and other non-human_____ make up only 3 of every 1000 animals needed in research.
5. Over 20.8 million people in the United States have _____.
6. Animal research contributes to the health and welfare of people and _____.
7. Scientists study electric_____ to learn about the nervous system.
8. _____ have helped us learn many things, including corneal transplants, cancer, and ear infections.
10. Our _____ system helps protect us from diseases.
11. _____ is the use of drugs to treat cancer.
13. Frederick _____ helped save the lives of thousands of diabetics when he discovered insulin.
14. In a healthy body, the _____makes insulin.
16. Scientists must follow many rules and_____ when they study animals.
17. Monkeys prefer to live in _____.

DOWN

1. The study of _____ has contributed to the development of burn treatments, the CT scan, and heart valve replacements.
2. _____have helped scientists test a vaccine for leprosy.
3. _____ have taught us many things about motor coordination diseases, such as syphilis and Parkinson's disease.
4. _____ provide health care for animals at biomedical research facilities.
9. When a person has Type 1 diabetes, his pancreas doesn't make enough _____.
12. In the wild, monkeys spend up to 70% of their days searching for food. This is called _____.
15. Scientists study _____ to learn more about the influenza virus.
16. Max is a rhesus ____.

WE HOPE YOU HAD FUN READING THIS BOOK AND DOING THE ACTIVITIES THAT WERE INCLUDED ALONG THE WAY. YOU CAN LEARN MORE ABOUT BIOMEDICAL RESEARCH AT THE FOLLOWING SITES. CHECK THEM OUT WITH YOUR PARENTS OR YOUR TEACHERS!

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE:
http://eurekalert.org/kidsnews

AMERICAN ASSOCIATION FOR LABORATORY ANIMAL SCIENCE:
www.ahc.umn.edu/rar/MNAALAS/index.html

AMERICANS FOR MEDICAL PROGRESS EDUCATION FOUNDATION:
www.ampef.org

BIOLOGICAL RESEARCH FOR ANIMALS AND PEOPLE:
www.biorap.org

BIOMEDICAL RESEARCH EDUCATIONAL FOUNDATION:
www.fbresearch.org

JOHNS HOPKINS CENTER FOR ALTERNATIVES TO ANIMAL TESTING:
http://caat.jhsph.edu

KIDS 4 RESEARCH:
www.kids4research.org

NEUROSCIENCE FOR KIDS:
http://faculty.washington.edu/chudler/neurok.html

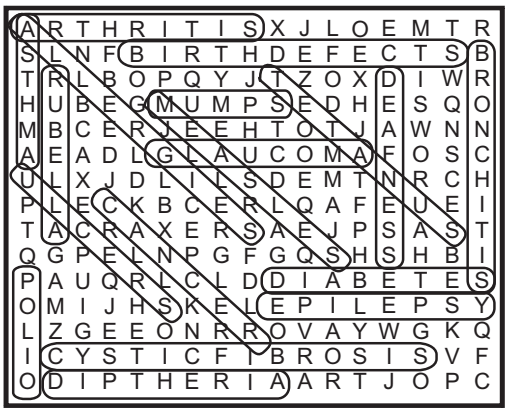
NORTHWEST ASSOCIATION FOR BIOMEDICAL RESEARCH:
www.nwabr.org

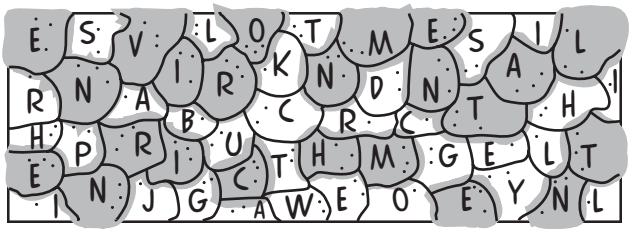
PROFILES IN SCIENCE:
www.profiles.nlm.nih.gov

PUZZLE SOLUTIONS

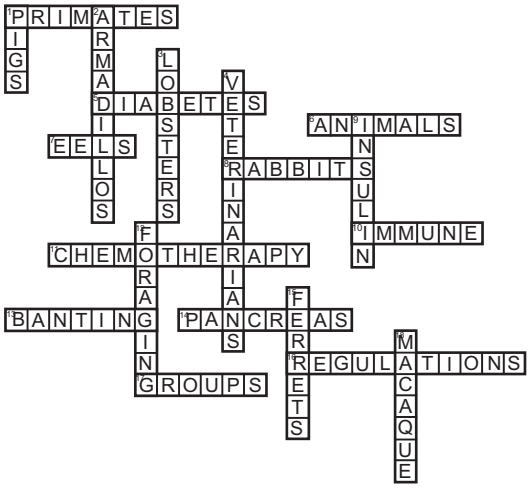
ANIMALS NEEDED IN RESEARCH

1. e
2. b
3. a
4. d
5. f
6. c





ENVIRONMENTAL ENRICHMENT



The information included in this booklet was provided by scientists and others at the Oregon National Primate Research Center (ONPRC), a research institute of Oregon Health & Science University. The mission of the ONPRC is to advance knowledge about health and disease in humans and animals through basic biomedical research.

Scientists at the ONPRC are trying to understand health-related problems in people so that they can find cures and treatments for diseases and illnesses. 4,000 monkeys (mostly rhesus macaques) live, work, and play at the ONPRC, which was opened in 1962. They are cared for by our very knowledgeable animal care staff, which includes veterinarians and a behavioral sciences unit that oversees the psychological well-being of the monkeys, most of which live outdoors in large social groups.

Recent studies have shown that rhesus macaques share about 93% of their genetic makeup with human beings. Because they are so similar to human beings, these animals can help scientists develop new medicines and treatments for people. Monkeys at the ONPRC are helping scientists learn more about weight regulation, Type II diabetes, premature birth, HIV/AIDS and depression.

If you would like to learn more about biomedical research at the Oregon National Primate Research Center, please visit our website: http://onprc.ohsu.edu

This material was funded by the

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