

VIRTUAL

BUGAPALOOZA!

brought to you by the NATIONAL
MUSEUM
OF HEALTH AND
MEDICINE

Family Guide



#Bugapalooza

Welcome to Bugapalooza! The National Museum of Health and Medicine is celebrating military medical entomology virtually with videos, fun facts, and more. Explore this family guide to learn more about bizarre, beneficial, and downright deadly bugs.

- Flies
- Bed Bugs and Kissing Bugs
- Mosquitoes
- Stop Bugging the Museum Artifacts!
- Ticks

VOCABULARY

Arthropods: invertebrate animals that have a segmented body and jointed appendages and chitinous shell that molts. Arthropods include insects, spiders, and crustaceans.

Bacterium: a member of a large group of unicellular microorganisms.

Blood meal: the blood ingested in one feeding by an arthropod.

Bug: an insect of a large order distinguished by having mouthparts that are modified for piercing and sucking. Bugs are part of the order *Hemiptera*.

Entomologist: a scientist who studies insects.

Insectary: a place where insects are grown, kept, exhibited, and studied.

Microscope: an optical instrument used for viewing very small objects or samples.

Parasite: an organism that lives in or on another organism (host) and benefits by deriving nutrients at the host's expense.

Pest: a destructive insect or animal that attacks food, materials, crops, etc.

Prevention: the act of stopping something before it happens.

Proboscis: tubular mouthpart used for feeding or sucking.

Vector or bug-borne illness: disease that is transmitted among animal or plant hosts often by arthropods (the vector).

Virus: an infective agent that is able to multiply only inside the living cells of a host.



Bugs come in all shapes and sizes. Bugs often bite to ward off predators or to ingest food. Sometimes these bites can cause infections or allergic reactions in humans.

Match the type of insect with the disease they transmit.

FLEA	LYME DISEASE
MOSQUITO	DYSENTERY
KISSING BUG	BUBONIC PLAGUE
TICK	CHAGAS DISEASE
HOUSE FLY	MALARIA

For more information visit: https://www.wrair.army.mil/sites/default/files/2019-05/WRAIR_Dispatch_Entomology.pdf

CAN YOU BEE-LIEVE IT?

There are 40,000 species of true bugs, and 3,800 live in the United States.



FLIES

Flies are a common problem for both the military and civilians. Even though flies can transmit diseases, they also can provide benefits to the ecosystem.

Use your knowledge of flies to determine if the following statements are true or false:

- ___ A butterfly is a true fly.
- ___ Flies can taste through their feet.
- ___ Maggots or fly larvae are used for medical treatments.
- ___ Flies don't have teeth.
- ___ Flies don't transmit disease.

CAN YOU BEE-LIEVE IT?

Blow flies are the first animal or insect to infest decomposing remains.

Answers: F, T, T, T, F



BED BUGS AND KISSING BUGS

Bugs come in a variety of shapes and colors. Most bugs or arthropods have the same basic anatomy. Using the list provided, label the anatomy of the bug.

Abdomen: segmented portion of the insect that contains the heart, reproductive organs, and digestive system.

Antenna: sensory appendages that are used for the sense of smell and balance.

Compound eye: eyes made of hexagonal lenses.

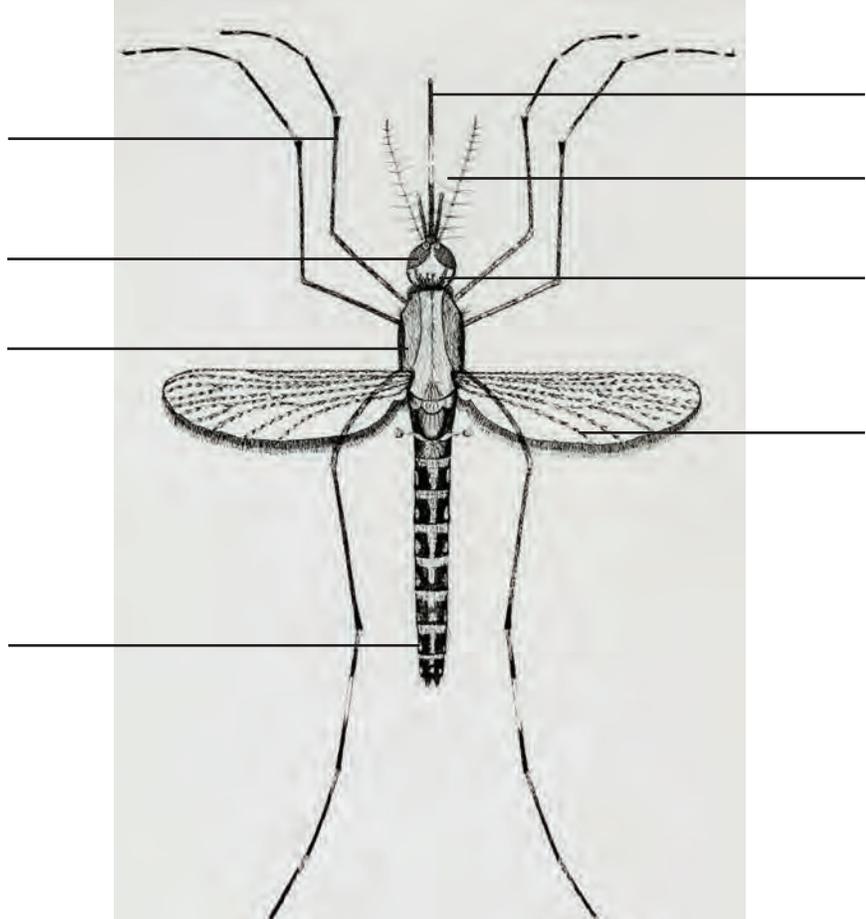
Head: contains the brain, eyes, proboscis, and the pharynx.

Leg: walking appendage; insects have six legs

Proboscis: elongated sucking mouthpart that is typically tubular and flexible.

Thorax: body section between the head and abdomen.

Wings: appendages that allow insects to fly.



CAN YOU BEE-LIEVE IT?

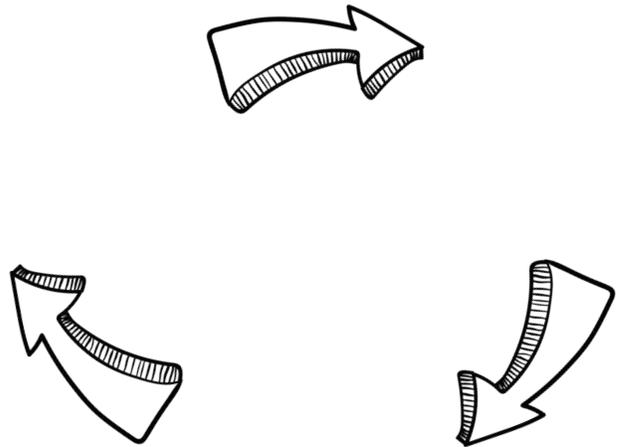
Bed bugs can survive for several months without needing a blood meal.



MOSQUITO WRANGLERS: A BUG'S EYE VIEW OF MEDICAL RESEARCH

Mosquitoes are vectors for a variety of diseases, including yellow fever, malaria, dengue, West Nile virus, and encephalitis. Vectors are organisms, such as insects, that transmit a disease or parasite from one animal/plant to another. Vectors do not contract the disease they transmit. Female mosquitoes feed on the blood of animal hosts and transfer disease to another host by regurgitating the blood meal. You can also find more information here: https://www.wrair.army.mil/sites/default/files/2019-05/WRAIR_Dispatch_Malaria.pdf

Visit https://www.cdc.gov/zika/pdfs/FS_AedesLifeCycle-p.pdf and draw the life cycle of malaria.



CAN YOU BEE-LIEVE IT?

Mosquitoes are attracted to carbon dioxide, lactic acid, and octanol (found in breath and sweat). Female mosquitoes have an anti-coagulant in their saliva that allows them to more easily ingest their meals. The saliva also induces an allergic reaction that produces an itchy bump when they bite humans.



STOP BUGGING THE MUSEUM ARTIFACTS!

Can you identify the following museum “bug” with the material they can damage?

	cotton	wool	silk	paper	wood	plastic	fur/skin	bone
Clover Mite								
Silverfish								
Carpet Beetle								
Bed bug								
Clothes Moth								
Termite								
Cockroach								
Booklouse								
Drugstore Beetle								
Wood-boring Beetle								
Larder Beetle								

CAN YOU BEE-LIEVE IT?

Cicadas, stink bugs, and leafhoppers are considered true bugs.



TICKS

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

Find the following words in the word search:

ROCKY MOUNTAIN
SPOTTED FEVER
BLACKLEGGED
LYME DISEASE
REPELLANT
FEEDING
TICKBORNE
VECTOR BORNE
BLOOD MEAL
TWEEZER
TARGET
CHECKS
DEET
RASH
LONE STAR
LARVA
WOODS
GRASS
NYMPH
ADULT
HOST
TICK
EGGS
BITE
DOG

RESOURCES

Armed Forces Pest Management Board: www.acq.osd.mil/eie/afpmb/

Walter Reed Army Institute of Research: www.wrair.army.mil/

Naval Medical Research Center:

www.med.navy.mil/sites/nmrc/NMRC/Pages/NMRC.aspx

Walter Reed Biosystematics Unit: www.wrbu.org/

Vector Biology Research and Education at USU:

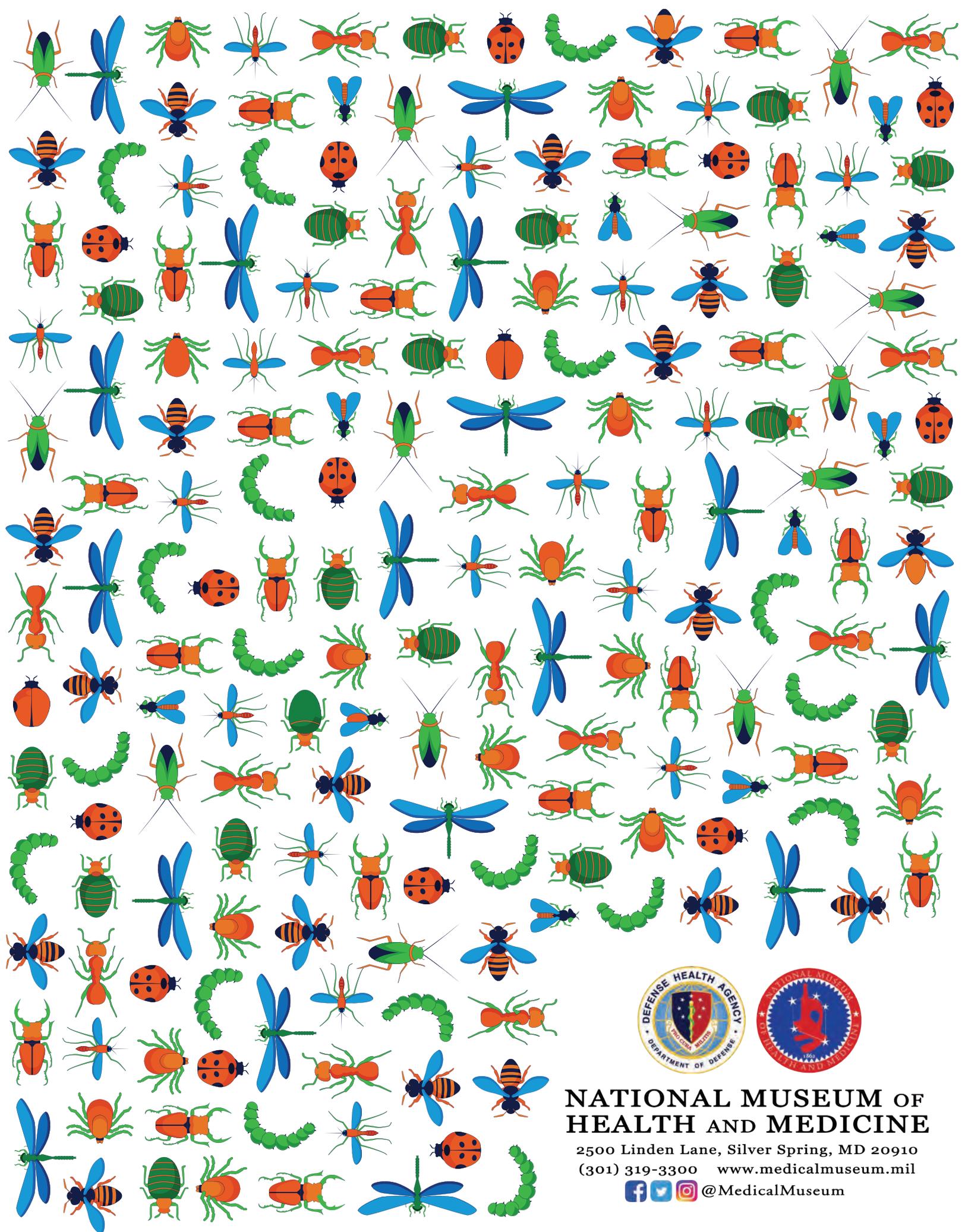
www.usuhs.edu/

CDC: www.cdc.gov

Mayo Clinic: www.mayoclinic.org

Images courtesy of Armed Forces Pest Management Board and NMHM





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