

Pre-AP Biology Summer Assignment 2018-19

Paradise High School, Mrs. Wood, lwood@pisd.net

Welcome to Pre-AP Biology! I am excited to get a jump on the upcoming school year. These assignments will help us get a head start on the curriculum and lay the foundation before school starts. If you have any questions, please email me.

Supplies – bring first day of school

Composition notebook (no spirals) – left in class

Folder – kept by the student for graded papers

Pencils/Pens

Glue sticks

Scotch tape

Kleenex

- 1 - Create an account on EDPuzzle and watch 5 videos and complete Cornell notes. Guides for Cornell notes can be found on my webpage. Go to edpuzzle.com, sign up as a student and use code – edsobfo – to join the summer biology class. *Due the first day of school.*
- 2 - Read 3 selected articles and take notes on each one using Cornell note taking style. The student must handwrite the notes and turn them in the *first day of school.* You can find links on my webpage to help you with the method of Cornell note taking.
- 3 - Studying the language of science is like learning a new language. Biology is largely comprised of Latin, so you will need to learn the following prefixes, suffixes, and roots from the next two pages. Study the attached list. Pay particular attention to the words used in the videos. These are a part of our first unit. There will be a *Prefix, Suffix, and Vocab Test the first week of school.*
4. Using the list from the following two pages, construct 20 words by combining prefixes and suffixes. Each word must be followed by a definition of what the word means. Your words do not have to be real words. You can have as many prefixes/suffixes in the word as you like. Example: Chlorophobia- fear of the color green. *Due the first day of school.*
- 5 - Specimen Collection – Collect, preserve, display, and name 10 organisms from the same Phylum. For example, collect 10 wildflowers, native grasses, tree leaves, insects, etc. Using preservation techniques such as glycerin, rubbing alcohol, or hand sanitizer preserve and display organisms in a box or book type setting. Identify the organism using the common name and scientific name, and label each specimen. *Due the first day of school*

Name _____ Date _____ Class _____

Language of Science

Example: biology – life, study or science (study of life)

1. phototropism—
2. hydrophobic—
3. heterotroph—
4. homeostasis—
5. multicellular—
6. hypodermic—
7. anthropology—
8. hypothermic—
9. gymnosperm—
10. pseudopod—
11. photograph—
12. autograph—
13. neuralgia—
14. decapod—
15. hepatitis—
16. cytology—
17. zoology—
18. microbiology—
19. geology—
20. cardiology—

Notice that several prefixes can mean the same thing:

21. What are two prefixes that mean ONE or SINGLE? _____
22. What are two suffixes that mean CUT or CUT OUT? _____
23. What are two prefixes that mean ABOVE or ON? _____
24. What are two prefixes that mean TWO? _____

Just knowing one part of a word gives you a clue to the whole word:

25. Would you want to be careful when touching an animal called an ECHINDNA? Yes No
26. What does a CARNIVORE eat? _____

27. Is a NEONATE a tiny baby or an old person? _____
28. Is a CRANIOTOMY a serious surgery? Yes No
29. An ALBINO rabbit is what color? _____
30. Does an AMPHIBIAN live on land or water? _____
31. If a medicine is CONTRAINDICATED for you, should you take it? Yes No
32. A DERMATOLOGIST works with what part of the body? _____
33. How does a tiny animal called a ROTIFER travel through the water? _____
(hint: look up rota)
34. If you visited the Elysian Park ARBORETUM, what would you expect to see? _____
35. In 1969, where did the LUNAR mission land? _____
36. What is another name for a CHRONOMETER? _____
37. Why do they call this symbol (*) an ASTERISK? _____

Scientific Root Words, Prefixes, And Suffixes

a-, an-	not, without, lacking, deficient	centi-	hundredth	-escent	becoming
ab-	away from, out from	centr-	center	eso-	inward, within, inner
-able	capable of	cephal-	head	eu-	well, good, true, normal
ac-	to, toward	cerat-	horn	eury-	widen
-aceous	of or pertaining to	cerebr-	brain	ex-	out of, away from
acou-, acous-	hear	cervic-	neck	extra-	beyond, outside
ad-	to, toward	chel-	claw	-fer-	bear, carry, produce
aden-	gland	chem-	dealing with chemicals	ferro-	iron
adip-	fat	chir-	hand	fibr-	fiber, thread
aero-	air	chlor-	green	-fid, fiss-	split, divided into
agri-	field, soil	chondr-	cartilage	-flect, -flex	bend
-al	having the character of	chrom-, -chrome	color	flor-	flower
alb-	white	chron-	time	flu-, fluct-, flux	flow
alg-, -algia	pain	-chym-	juice	foli-	leaf
alto-	high	-cid-, -cis-	cut, kill, fall	fract-	break
ambi-	both	circa-, circum-	around, about	-gam-	marriage
ameb-	change, alternation	cinu-	hairlike curls	gastr-	stomach
amni-	fetal membrane	co-	with, together	geo-	land, earth
amphi-, ampho-	both	cocc-	seed, berry	-gen, -gine	producer, former
amyl-	starch	coel-	hollow	-gene-	origin, birth
ana-	up, back, again	coll-	glue	-gest-	carry, produce, bear
andro-	man, masculine	coni-	cone	-glen-	eyeball
anemo-	wind	contra-	against	-glob-	ball, round
ang-	choke, feel pain	corp-	body	glossa-	tongue
angi-	blood, vessel, duct	cort-, cortic-	outer layer	gluc-, glyco-	sweet, sugar
ante-	before, ahead of time	cosmo-	world, order, form	glut-	buttock
anter-	front	cotyl-	cup	gnath-	jaw
antho-	flower	counter-	against	-gon	angle, corner
anti-	against, opposite	crani-	skull	-grad-	step
anthropo-	man, human	cresc-, cret-	begin to grow	-gram, graph	record, writing
-ap-, -aph-	touch	crypt-	hidden, covered	grav-	heavy
apo-, ap-	away from	-cul-, -cule	small, diminutive	-gross-	thick
aqu-	water	cumul-	heaped	gymno-	naked, bare
archaeo-	primitive, ancient	cuti-	skin	gyn-	female
-ary, -arium	denotes a place for something	cyan-	blue	gyr-	ring, circle, spiral
arteri-	artery	-cycle, cycl-	ring, circle	-hal-, -hale	breathe, breath
arthr-	joint, articulation	-cyst-	sac, pouch, bladder	halo-	salt
-ase	forms names of enzymes	cyt-, -cyte	cell, hollow container	hapi-	simple
aster-, astr-	star	dactyl-	finger	hector-	hundred
-ate	verb form – the act of	de-	away from, down	-helminth-	worm
anther-	fatty deposit	deca-	ten	hem-	blood
-ation	noun form – the act of	deci-	tenth	hemi-	half
atmo-	vapor	deliquesc-	become fluid	hepar-, hepat-	liver
audi-	hear	demi-	half	herb-	grass, plants
aur-	ear	dendr-	tree	hetero-	different, other
auto-	self	dent-	tooth	hex-	six
bacter-, bactr-	bacterium, stick, club	derm-	skin	hibern-	winter
barb-	beard	di-, dipl- (Latin)	two, double	hidr-	sweat
baro-	weight	di-, dia- (Greek)	through, across, apart	hipp-	horse
bath-	depth, height	dia- (Latin)	day	hist-	tissue
bene-	well, good	digit-	finger, toe	holo-	entire, whole
bi- (Latin)	two twice	din-	terrible	homo- (Latin)	man, human
bi-, bio- (Greek)	life, living	dis-	apart, out	homo- (Greek)	same, alike
-blast-	sprout, germ, bud	dorm-	sleep	hort-	garden
brachi-	arm	dors-	back	hydr-	water
brachy-	short	du-, duo-	two	hygr-	moist, wet
brady-	slow	-duct	lead	hyper-	above, beyond over
branchi-	fin	dynam-	power	hyph-	weaving, web
brev-	short	dys-	bad, abnormal, difficult	hyphno-	sleep
bronch-	windpipe	ec-	out of, away from	hypo-	below, under, less
cac-	bad	echin-	spiny, prickly	hyster-	womb, uterus
calor-	heat	eco-	house	-lae	person afflicted with disease
capill-	hair	ecto-	outside of	-lasis	disease, abnormal condition
capit-	head	-elle	small	-ic	(adjective former)
carcin-	cancer	-emia	blood	-chthy-	fish
cardi-	heart	en-, endo-, ent-	in, into, within	ign-	fire
carn-	meat, flesh	-en	made of	in-, il-, im-, ir-	not
carp-	fruit	encephal-	brain	in-, il-, im-, ir-	to, toward, into
carpal-	wrist	enter-	intestine, gut	in-	very, thoroughly
cata-	breakdown, downward	entom-	insects	-ine	of or pertaining to
caud-	tail	-ecous	nature of, like	infra-	below, beneath
-cell-	chamber, small room	epi-	upon, above, over	inter-	within, inside
cen-, cene-	now, recent	-err-	wander, go astray	intra-	between
cente-	pierce	erythro-	red	-ism	a state or condition

iso- equal, same
 -ist person who deals with
 -it is inflammation, disease
 -ium refers to a part of the body
 -kary- cell nucleus
 -kel- tumor, swelling
 -kerat- horn
 -kilo- thousand
 -kine- move
 -lachry- tear
 -lact- milk
 -lat- side
 -leio- smooth
 -less without
 leuc-, leuk- white, bright, light
 -lign- wood
 -lin- line
 -lingu- tongue
 -lip- fat
 -lith-, -lite stone, petrifying
 loc- place
 -log- word, speech
 -logist one who studies
 -logy study of
 lumin- light
 -lys-, -lyt-, -lyst decompose, split, dissolve
 macr- large
 malac- soft
 -malle- hammer
 -mamm- breast
 -marg- border, edge
 -mast- breast
 -med- middle
 -meg- million, great
 -mela-, melan- black, dark
 -mer part
 mes- middle, half, intermediate
 -met-, meta- between, along, after
 -meter-, -metry measurement
 micro- small, millionth
 -milli- thousandth
 -mis- wrong, incorrect
 -mito- thread
 -mole- mass
 -mono- one, single
 -mort- death
 -mot- move
 -morph- shape, form
 -multi- many
 -mut- change
 -my- muscle
 -myc- fungus
 -mycel- threadlike
 -myriad- many
 -molt- soft
 -nas- nose
 -necr- corpse, dead
 -nemat- thread
 -neo- new, recent
 -nephr- kidney
 -ner- moist, liquid
 -neur- nerve
 -noct-, nov- night
 -node knot
 -nom-, -nomy ordered knowledge, law
 non- not
 -not- back
 -nuc- center
 -ob- against
 -ocul- eye
 -oct- eight
 -odont- tooth
 -ond form, appearance
 -olf- smell
 -oligo- few, little
 -oma abnormal condition, tumor
 -omni- all
 -onc- mass, tumor

oc-
 -ophthalm-
 -opt-
 -orb-
 -orium-, -ory
 -ornith-
 -orth-
 -oscu-
 -osis
 -oste-
 -oto-
 -ous
 -ov-
 -oxy-
 -pachy-
 -paleo-
 -palm-
 -pan-
 -par-, para-
 -path-, -pathy
 -ped-
 -ped-
 -pent-
 -per-
 -peri-
 -permea-
 -phag-
 -pheno-
 -phil-
 -phon-, -phone
 -phore-, pher-
 -photo-
 -phren-
 -phyc-
 -phyl-
 -phyll
 -physic-
 -phyt-, phyte
 -pino-
 -pinni-
 -plan-
 -plasm-, -plast-
 -platy-
 -pleur-
 -pneumo-
 -pod
 -ply-
 -por-
 -port-
 -post-
 -pom-
 -pre-
 -prim-
 -pro-
 -p[ro]to-
 -pseudo-
 -psych-
 -pter-
 -pulmo-
 -puls-
 -pyr-
 -quadr-
 -quin-
 -radi-
 -re-
 -rect-
 -ren-
 -ret-
 -rhag-, -r[ha]ge
 -rhe-, rhea
 -rhin-
 -rhiz-
 -rhodo-
 -roto-
 -rubr-
 -sacchar-
 -sapr-
 -sarc-

egg
 eye
 eye
 circle, round, ring
 place for something
 bird
 straight, correct, right
 mouth
 abnormal condition
 bone
 ear
 full of
 egg
 sharp, acid, oxygen
 thick
 old, ancient
 broad, flat
 all
 beside, near, equal
 disease, suffering
 foot
 child
 five
 through
 around
 pas, go
 eat
 show
 loving, fond of
 sound
 bear, carry
 light
 mind, diaphragm
 seaweed, algae
 related group
 leaf
 nature, natural qualities
 plain
 drink
 feather
 roaming, wandering
 form, formed into
 flat
 lung, rib, side
 lungs, air
 foot
 many, several
 opening
 carry
 after, behind
 fruit
 before, ahead of time
 first
 forward, favoring, before
 first, primary
 false, deceptive
 mind
 having wings or fins
 lung
 drive, push
 heat, fire
 four
 five
 ray
 again, back
 right, correct
 kidney
 net, made like a net
 burst forth
 flow
 nose
 root
 rose
 wheel
 red
 sugar
 rotten
 flesh

lizard
 split, divide
 know
 hard
 look, device for seeing
 write
 half, partly
 partition, seven
 infection, putrefaction
 sit
 six
 condition, state
 sun
 loosen, free
 body
 sleep
 sound
 look at
 seed
 ball, round
 breathe
 seed
 standing, placed, staying
 stars
 narrow
 chest, breast
 mouth
 strat
 solid, 3-dimensional
 drawn tight
 pillar
 under, below
 over, above, on top
 together
 quick, swift
 ankle
 arrange, put in order
 far off, distant
 end
 earth, land
 four
 young shoot
 put
 cover a surface
 heat
 cut, slice
 poison
 place
 windpipe
 across
 three
 hair
 turn, change
 nourishment, one who feels
 whirl
 diminutive, small
 beyond
 one
 urine
 tail
 vessel
 carry
 come
 belly, underside
 turn, slant
 strong
 life
 roll, wander
 devour, eat
 yellow
 dry
 wood
 animal
 joined together
 yeast

Zebra poop shows that life without enough resources can cause stress

By Smithsonian.com, adapted by Newsela staff on 12.06.17

Word Count 943

Level 1200L



Compared to their cousins, the more populous plains zebra, the cape zebras are thinner, have narrower hooves and sport a distinctive barcode-like stripe pattern on their backs. Photo by Brian Skelton/Wikimedia

For conservation scientists, the proof isn't in the pudding — it's in the poop. It turns out that wild zebras have been dropping vital clues about their stress levels in the form of feces. Researchers are now beginning to unravel these smelly piles of data to learn important clues about the animals' well-being.

"Poop allows us to get into the inside of the animal," says Rachel Santymire, director of the Davee center for Epidemiology and Endocrinology at the Lincoln Park Zoo in Chicago. "I always say they can't lie to me."

This article is available at 5 reading levels at <https://newsela.com>.

Poop-scooping has proved especially useful for cape zebras. A once-precariously endangered species, today it inhabits the eastern and western capes in the southern end of Africa. Compared to their cousins, the more numerous plains zebra, they are thinner, have narrower hooves and sport a distinctive barcode-like stripe pattern on their backs.

Their unusual looks, however, have gotten them into some trouble.

Between 1960 and 1980, populations declined due to habitat destruction, fencing and unregulated hunting for their distinctive striped pelts. At its lowest point, the population dwindled to just 80 animals stranded on three separate mountaintops. Despite the recovery in recent years, scientists remain uncertain whether current numbers can survive new pressures. They face habitat destruction due to human development and a changing climate that may turn their last hold-outs into unsuitable habitat.

Hormones Are Indicators Of High Stress

To track the success of past conservation efforts, biologists are now analyzing zebra poop for hormones that indicate high levels of stress. Glucocorticoid hormones, in particular, can help regulate stress responses in animals that influence whether they will fight or flee. Traces of these biochemicals can be found in droppings, skin, nails and hair. And it's not just in zebras, but in humans and most other mammals.

Susanne Shultz studies evolutionary biology at the University of Manchester and is one of the coauthors of a study recently published in *Functional Ecology*. Researchers have used poop to determine animal stress before, she says. But until now, nobody has used poop-embedded stress hormones to compare animals across a population, or to compare the relative stress between populations living in different habitats.

Given how much long-term population data researchers have on them and their remarkable comeback, cape zebras might make the perfect subject.

Today there are between 4,000 and 5,000 zebras in the wild, spread across 75 different populations. The Mountain Zebra National Park, founded in 1937, is meant to protect some of the last remaining savannas in the southern part of the country. This has helped sustain the zebra population. But some 95 percent of the cape zebras come from one of three populations that survived the tough times in the 20th century, meaning they all have very similar genetics and could more easily be wiped out by disease.

Moreover, Shultz says that some aren't doing well possibly due to the fact they've been forced into a less desirable habitat. The area where they live is too dry for them. Climate change may be further complicating the issue, Shultz says, as it is causing rainfall to become less predictable in the area, which can affect suitable habitat for zebras.

This article is available at 5 reading levels at <https://newsela.com>.

Struggling Animals Are Constantly Stressed

"It's perceived that that's where the mountain zebra want to be rather than that's where the mountain zebra were left," she says. "What seems like a good outcome might not be as good as we think it is."

Shultz and her coworkers used poop samples to track the success of management efforts in real time. Starting in 2011, they took six sampling trips to six different zebra populations over the span of two years. They examined the poop for glucocorticoid hormones and checked on the health of the males by testing their testosterone hormone levels. The findings were compared with general species information.

In the populations that did well, they found high levels of testosterone only in mating seasons and high stress only during the cold season. But in the struggling populations, the animals had more constant testosterone and stress levels. "They never had a break, essentially," Shultz says. Over the whole two-year period they were constantly stressed out.

This might be because their environment does not meet their needs. But it might also have to do with an imbalance of males and females in the population. If there are too many males, it raises their stress and testosterone levels as they compete for females, according to Shultz.

Poop Is Readily Available For Studies

Tracking stress responses by using poop is a game-changer because it's noninvasive and the raw materials aren't exactly hard to come by, says Samlynite, who wasn't involved in the recent study. Shultz and her coauthors did a good job of tracking individuals through poop samples, she adds. They paid attention to the animals' diets and controlled for seasonal changes.

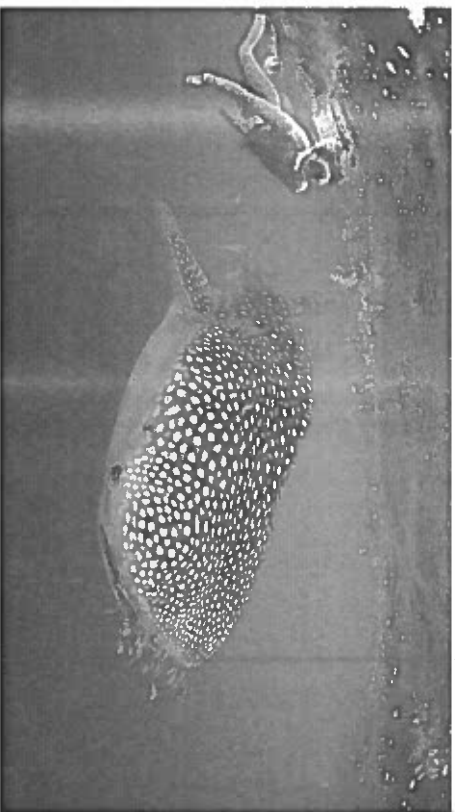
A few years ago, Samlynite — whose coworkers know her as "Dr. Poop" — also published a poop study. It examined how increased predators and competition impacted the health and reproductive rates of black rhinos in South Africa. However, she and her coworkers are now starting to move away from using feces. The biochemical keratin found in claws and nails and even snake skins are better at determining high-stress levels, she says.

Keratin doesn't change as much day by day, so these samples can provide more accurate readings, she says. Yet as far as Shultz is concerned, there is a bright future in scooping up poop from all kinds of animals — not just zebras.

"The zebra are a really good test case because we have long-term data," she says. But "the idea is to prove this concept with this species."

Researchers use environmental DNA in ocean water to study whale sharks

By Los Angeles Times, adapted by Newsela staff on 11.30.16
Word Count 633



A female researcher swims with a whale shark, Rhinoptera bonasus, off the coast of Africa. Ulfstein Beldjocary/Imagos

Whale sharks are the largest fish in the ocean, but their size doesn't make them any easier to study. Scientists hoping to learn about them must spy on them from the air, tag them with devices so they can be tracked via satellite or sneak up on them to collect tissue samples for analysis. But there may be an easier way.

Researchers from Denmark and Qatar were able to learn about a group of whale sharks in the Persian Gulf without using any of those methods. Instead, the researchers gathered the seawater around them and analyzed the 'environmental DNA' it contained.

Samples Of Seawater

A report published Monday in *Nature Ecology & Evolution* describes the researchers' findings. The research team used 20 samples of seawater to study the recently discovered group of about 200 whale sharks. They were able to show that the group was more closely related to whale sharks from the tropical portions of the Indian and Pacific oceans than to the colonies in the Atlantic. They were also able to estimate the number of breeding females in the population.

This article is available at 5 reading levels at <https://newsela.com>.

The surface seawater samples were collected from 15 spots around the Al Shaheen oil field, where the whale sharks had been observed. Most of the samples contained just 1.5 liters of water, which is just over 6 cups.

The researchers used DNA sequencing machines to decode the mitochondrial DNA extracted from the water. DNA sequencing gives information about the exact genetic structure of a creature. Mitochondrial DNA, which is passed down from mother to child virtually unchanged, is often used in evolutionary biology to determine whether two populations of animals are related.

Mitochondrial Genome

The researchers zeroed in on just a few sections of the mitochondrial genome, which is a complete set of genetic instructions. This allowed them to gauge the genetic diversity, the total number of genetic characteristics, of the Persian Gulf whale sharks. They then compared the sharks to their cousins in the Atlantic, Indian and Pacific oceans.

The team also had access to mitochondrial DNA from tissue samples collected from 61 whale sharks who swam in the same waters. They used the DNA from the other sharks to check their work. The researchers found genetic fingerprints — collections of mutations known as haplotypes — in similar frequencies in both the seawater and the whale shark tissue. What's more, the catalog of haplotypes gathered from the seawater was more complete than the ones contained in the tissue samples alone.

By counting up the accumulated mutations in certain parts of the genome, the researchers calculated that the whale sharks had an 'effective female population size' of between 43,618 and 183,526. This is the population of mothers that give birth to the next generation. Doing the same analysis with the tissue samples instead of the DNA from seawater yielded a range of 85,087 to 351,654 females.

The average of the two ranges was off by nearly a factor of two (771,600 versus 138,400). However, the fact that they overlapped at all shows that environmental DNA offers a promising way to estimate effective population size, the researchers wrote.

Spawning Tuna

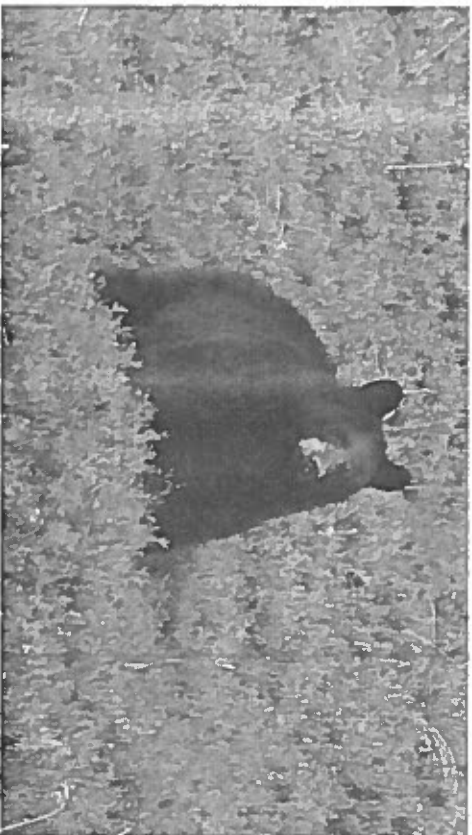
The seawater samples also contained DNA fragments from mackerel tuna, which spawn near Al Shaheen. In fact, the greater the concentration of whale shark DNA, the greater the concentration of tuna DNA. The reverse was also true. When whale shark DNA was relatively scarce, tuna DNA was scarce as well. This is most probably a sign that the whale sharks had come to the area to hunt the tuna, the researchers wrote.

Other groups have already used environmental DNA to identify the inhabitants of certain waters. However, this is the first study to show that environmental DNA can provide meaningful information about a population of animals and the biodiversity of their habitat, the authors wrote.

This article is available at 5 reading levels at <https://newsela.com>.

What does a bear do in the Alaska woods? Disperse seeds

By Dan Joling, Associated Press, adapted by Newsela staff on 02.26.18
 Word Count 544
 Level MAX



A black bear walks through dense bushes of blueberries in Juneau, Alaska. A study of bears and berries has determined that the big animals are the main dispersers of fruit seeds in southeastern Alaska. Photo from: Tsal Levi and Larijo Harjo via AP

Does a bear leave scat in the woods? The answer is obvious but the effects on an ecosystem may not be.

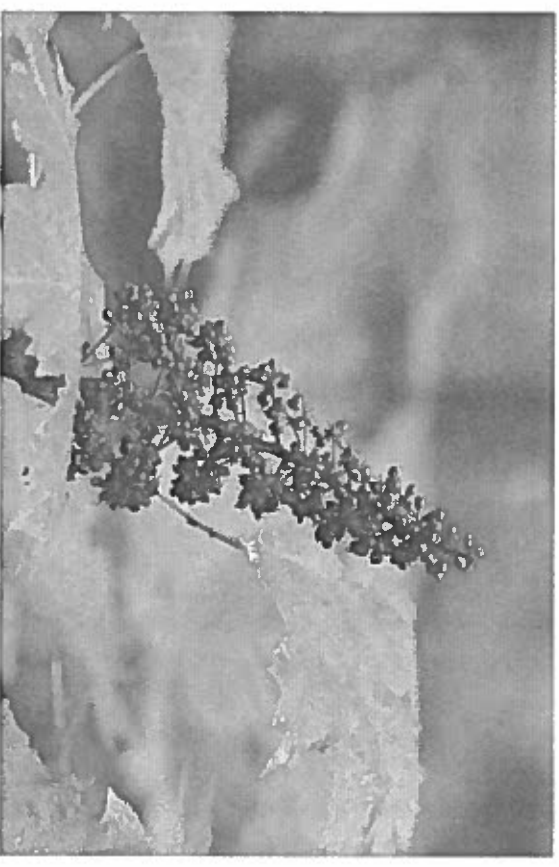
Researchers from Oregon State University did a study. It concludes that brown and black bears -- and not birds, as commonly thought -- are primary distributors of small fruit seeds in southeastern Alaska. The bears spread the seeds through their excrement.

"Bears are essentially like farmers," said Tsal Levi, an Oregon State assistant professor. "By planting seeds everywhere, they promote a vegetation community that feeds them."

Seed dispersal is a key component in the understanding of any ecosystem, Levi said. The study is the first instance of a temperate plant being primarily dispersed by mammals through their gut. The finding suggests repercussions for plant life when bears are removed.

This article is available at 5 reading levels at <https://newsela.com>.

1



Brown bears, or grizzlies, flourish in size and numbers in the Tongass National Forest, America's largest. They gorge on spawning salmon in the forest's rivers, lakes and streams. As they wait for fish to enter streams, the bears eat berries.

Levi and graduate student Laurie Harter, the study's primary author, set up motion-triggered video cameras. The cameras allowed them to detect which animals were eating berries. The researchers collected bear DNA from saliva left on plants after berries disappeared. They recorded birds picking off a few berries at a time. Bears were recorded gulping berries by the hundreds.

When brown bears shift to eating fish, black bears move into berry patches.

Both bears, through their scat, disperse fruit seeds by the thousands. This profoundly affects what grows in the forest, according to the researchers.

Rodents that find bear scat further disperse seeds. They bury the seeds in caches a few millimeters deep, Levi said. If rodents lose track of caches, there's a chance for new plant growth. It's an intricate system starting with salmon attracting bears, Levi said.

This article is available at 5 reading levels at <https://newsela.com>.

2



Laura Gough is an ecologist at Towson University. She has conducted research for more than 20 years on how plants interact with other organisms in Alaska's tundra. Gough said a lot of ecology research focuses on uncovering those relationships and how whole systems change if they're disrupted.

"When you think about that, if the species is an important food source, then if that plant should diminish in abundance, there could be a whole suite of changes to that ecosystem," she said. When she read the study, she said, she thought of the dodo bird stories she tells to students in biology classes. "The extinct birds spread seeds of certain plants.

"When dodos went extinct, those plants basically went extinct as well," she said. "So, this link between animals that eat plant seeds and disperse them — that can maintain both populations."

The Oregon State study concludes that if bears are removed, the seeds they move would simply fall to the ground. A decline in bear density, even if only brown bears, likely leads to a reduction in seed dispersal. And that would have consequences for plants.