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NTS NEWSLETTER

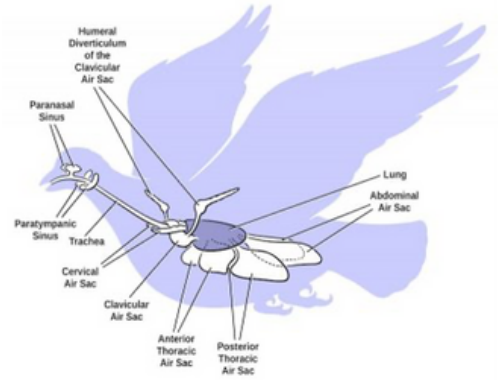
PUBLISHED BY THE NON-TRADITIONAL SPECIES CLUB AT THE UNIVERSITY OF ILLINOIS

WHAT'S INSIDE?

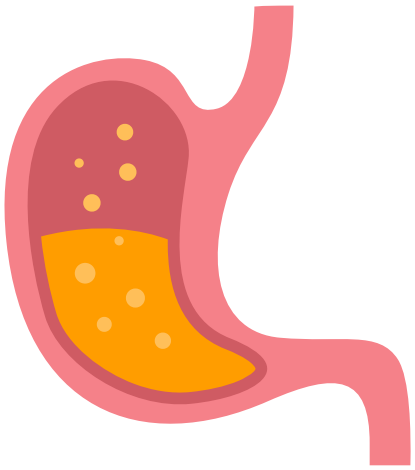
AVIAN SOFT TISSUE ANATOMY
BY: MARG BEDNAREK

RESPIRATORY

THE AVIAN RESPIRATORY SYSTEM FUNCTIONS MUCH DIFFERENTLY THAN MAMMALS. FOR EXAMPLE, BIRDS DO NOT HAVE A DIAPHRAGM. INSTEAD, BIRDS USE THEIR PECTORAL MUSCLES TO PULL THE KEEL OUT, CREATING NEGATIVE SPACES IN THE CAUDAL AIR SACS. AIR RUSHES INTO THESE AREAS, CAUSING INHALATION, AND AIR IS HELD HERE UNTIL IT TRAVELS THROUGH THE LUNGS. AFTER TRAVELING THROUGH THE LUNGS, THE DEOXYGENATED AIR IS THEN HELD IN THE CRANIAL AIR SACS UNTIL IT IS EXHALED FROM THE BODY.



GASTROINTESTINAL



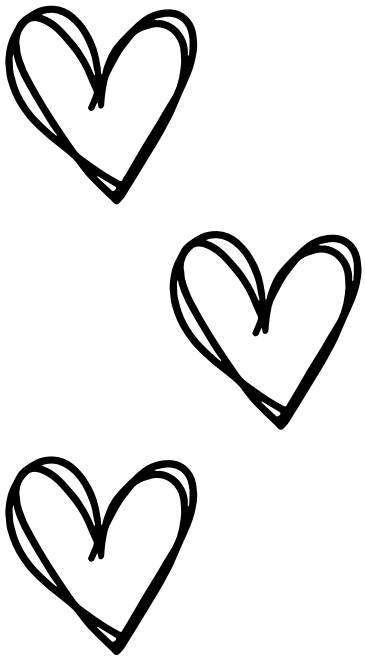
THE GASTROINTESTINAL TRACT BEGINS AT THE BEAK. OPPOSITE OF MAMMALS, THE ESOPHAGUS IN BIRDS LIES ON THE RIGHT SIDE. THINK, "MAMMALS ON LEFT, BIRDS ON RIGHT." IT IS IMPORTANT TO KNOW WHICH SIDE OF THE NECK TO FIND THE ESOPHAGUS FOR GAVAGE FEEDING. MANY SPECIES HAVE A CROP, WHICH IS A DIVERTICULUM OF THE ESOPHAGUS THAT IS LOCATED NEAR THE THORACIC INLET. THE CROP FUNCTIONS TO TEMPORARILY STORE FOOD AND CROP PALPATION CAN TELL HOW RECENTLY A BIRD HAS EATEN, WHAT KIND OF FOOD THEY HAVE EATEN, OR IF THEY HAVE BEEN GAVAGE FED AN APPROPRIATE AMOUNT. THERE IS A LOT OF INFORMATION THAT CAN BE DETERMINED FROM THE CROP, SO THIS IS AN IMPORTANT STRUCTURE TO KNOW HOW TO FIND.

ONCE PASSING THROUGH THE CROP, FOOD TRAVELS TO THE PROVENTRICULUS, WHICH IS THE GLANDULAR STOMACH. HERE, FOOD IS CHEMICALLY DIGESTED BEFORE MOVING TO THE VENTRICULUS, OR GIZZARD. THIS IS A MUSCULAR ORGAN THAT MECHANICALLY DIGESTS FOOD. FOOD MAY MOVE BACK AND FORTH BETWEEN THESE TWO STOMACH COMPARTMENTS UNTIL FOOD IS PROPERLY DIGESTED, WHERE IT THEN MOVES INTO THE SMALL INTESTINE.

TO REMAIN LIGHTWEIGHT FOR FLIGHT, BIRDS HAVE SHORTENED INTESTINAL TRACTS THAT ALLOW FOOD TO DIGEST AND PASS FOOD MORE QUICKLY. THE END OF THE GI TRACT IS THE CLOACA, WHICH COLLECTS AND EXPELS WASTE FROM THE COLON. THE CLOACA ALSO SERVES AS AN OPENING FOR THE UROGENITAL AND REPRODUCTIVE TRACTS AS WELL.

CARDIOVASCULAR

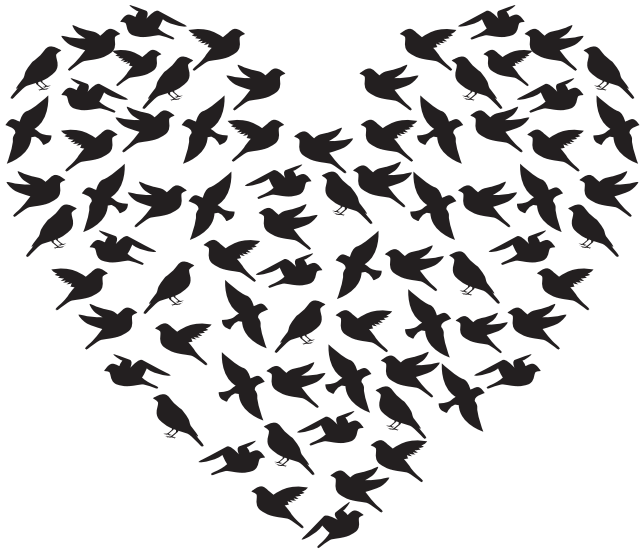
DUE TO THEIR ABILITY TO FLY AT HIGH ALTITUDES, DIVE DEEP IN COLD WATER, RUN IN HOT DESERTS, AND ALL THE OTHER AMAZING ADAPTATIONS BIRDS HAVE DEVELOPED TO SURVIVE IN A VARIETY OF ENVIRONMENTS, IT'S SAFE TO SAY THAT ALL BIRD'S CARDIOVASCULAR SYSTEMS HAVE VERY HIGH DEMANDS. LIKE MOST MAMMALS, THE AVIAN HEART HAS FOUR CHAMBERS THAT ALL FUNCTION SIMILARLY. HOWEVER, COMPARED TO MAMMALS, AVIANS HAVE HIGHER STROKE VOLUME, AVERAGE HEART RATE, ARTERIAL BLOOD PRESSURE, CARDIAC OUTPUT, AND HEART TO BODY WEIGHT RATIO. THEY ALSO HAVE 3 CUSPS ON THE LEFT ATRIOVENTRICULAR (AV) VALVE, 1 MUSCULAR FLAP ON THE RIGHT AV VALVE WITHOUT CHORDAE TENDINAE, AND TWO CRANIAL VENA CAVAE TO COMPENSATE FOR THE HIGHER CARDIAC DEMAND.



REPRODUCTION

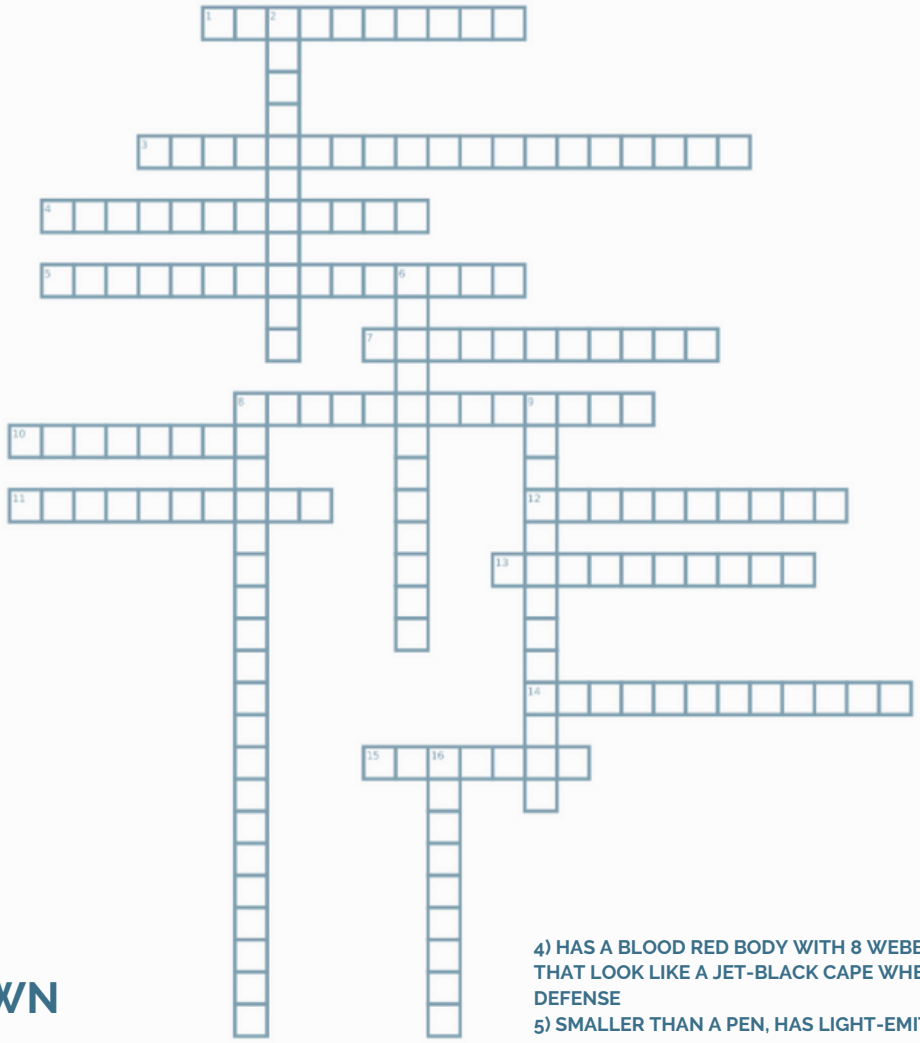
IN AVIANS, MALES HAVE TWO FUNCTIONAL TESTICLES, THOUGH ONE MAY BE LARGER THAN THE OTHER AND BOTH CAN INCREASE GREATLY IN SIZE DURING BREEDING SEASON. AVIANS REPRODUCE THROUGH INTERNAL FERTILIZATION, AND MOST SPECIES DO NOT HAVE AN EXTERNAL PHALLUS.

IN FEMALES, THERE IS NO CERVIX; THE OVIDUCT OPENS DIRECTLY INTO THE CLOACA. BOTH OVARIES AND OVIDUCTS ARE PRESENT AT HATCHING, BUT SHORTLY AFTER, THE RIGHT SIDE REGRESSES AND LEAVES MOST SPECIES WITH ONLY A DEVELOPED LEFT OVARY AND OVIDUCT. AS THE FOLLICLE MOVES DOWN THE OVIDUCT, THE ALBUMEN IS CREATED, ENVELOPED BY THE SHELL MEMBRANE, AND FINALLY COVERED IN A CALCIFIED SHELL BEFORE LAYING.



SCARY SEA CREATURES OF THE DEPTHS

BY: MADISON KASBAUM

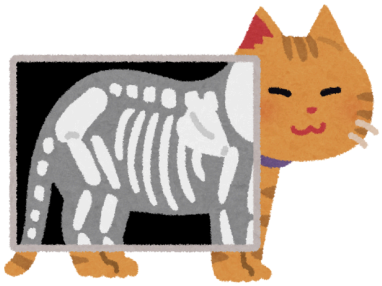


DOWN

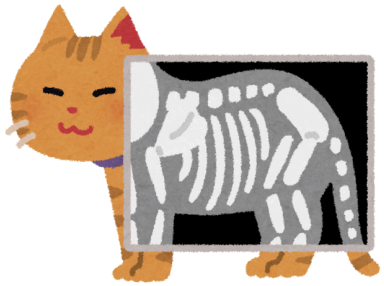
2) A LIVING FOSSIL SPECIES KNOWN FOR ITS HIDEOUS CHARACTERISTICS OF LONG SNOUTS WITH JAWS THAT SPRING FORWARD TOWARD THEIR PREY
6) HAS JAWS LINED WITH 25 ROWS OF BACKWARD-FACING, TRIDENT-SHAPED TEETH
8) SHAPED LIKE A HEART AND COLORED DEEP CRIMSON THAT MAKES IT NEARLY INVISIBLE WHEN FLOATING IN THE DEPTHS
9) HAS THE LARGEST TEETH OF ANY MARINE SPECIES ORGANS RELATIVE TO THE SIZE OF ITS BODY, UNABLE TO CLOSE ITS MOUTH
16) JET BLACK, WITH A HUGE, GAPING MAW THAT CAN GROW UP ENGULF PREY TWICE ITS SIZE, BODY COMES TO A STINGER-LIKE POINT THAT CAN FLASH BRIGHT RED

ACROSS

1) HIDDEN IN THE DARK, IT USES A LARGE BRIGHT LURE TO BRING PREY UP CLOSE TO ITS SHARP TEETH
3) HAS A SINGLE, ELONGATED TOOTHY CLAW ON ONE LIMB, PUNCTURES HOLES IN MALE COMPETITORS DURING DISPUTES
4) HAS A BLOOD RED BODY WITH 8 WEBBED ARMS THAT LOOK LIKE A JET-BLACK CAPE WHEN RAISED IN DEFENSE
5) SMALLER THAN A PEN, HAS LIGHT-EMITTING ORGANS ALONG ITS BODY THAT CONFUSES PREDATORS AND LIGHT ITS WAY IN THE DARK
7) A COLOSSAL MEAT-EATING CRUSTACEAN THAT CAN GROW UP TO 16 INCHES IN SIZE, ROLLY POLLY OF DEATH
8) ENCASED IN A TRANSPARENT DOME, IT HAS TUBULAR EYES DIRECTED UPWARDS TO DETECT PREY THEN ROLL DOWN TO TRACK
10) CAN GROW AS LONG AS 4FT WITH 750 VERTEBRAE WHILE WEIGHING ONLY A 1/2LB, LONG BEAK IS FULL OF TEETH AND UNABLE TO CLOSE
11) CAN GROW UP TO 10FT, HIDES IN SAND, MOVES WITH SPEED AND STRENGTH THAT SOMETIMES SPLITS PREY IN HALF WITH ITS SHARP TEETH
12) LIVES IN ALMOST TOTAL DARKNESS AND RELIES ON VEIN-LIKE SENSORY ORGANS TO DETECT THE MOVEMENT OF PREY
13) KNOWN AS THE SEA TOAD, MASTER AT CAMOUFLAGE AND DISPLAYS A SMALL LURE AT THE TOP OF THEIR HEAD
14) RESEMBLES A GIANT TADPOLE WITH NO FACE, RETRACTING PROTRUDED MOUTH TO GOBBLE UP ITS PREY
15) ALSO KNOWN AS SLIME EELS FROM THEIR DEFENSE MECHANISM, HAVE 5 HEARTS, SCAVENGE DEAD CARCASSES OF FISH FROM THE INSIDE OUT USING THEIR RASPING TONGUE

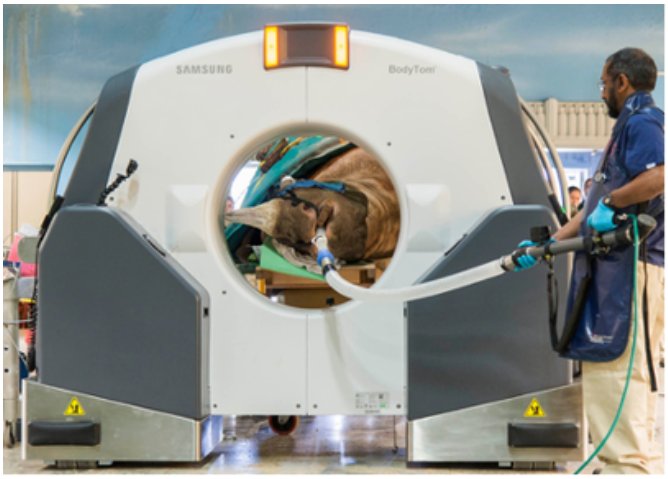


ADVANCING ZOOLOGICAL RADIOLOGY
BY: OLIVIA BONCOSKY



IN RECENT YEARS, A UNIQUE PROBLEM PRESENTED ITSELF TO ZOOLOGICAL VETERINARIANS - HOW CAN WE IDENTIFY ABNORMAL DIAGNOSTIC IMAGING RESULTS IN EXOTIC SPECIES WITHOUT ESTABLISHED DOCUMENTATION OF WHAT NORMAL IS? THIS BECAME APPARENT WHEN BROOKFIELD ZOO OF CHICAGO, ILLINOIS PERFORMED A CT SCAN ON THEIR RESIDENT EASTERN BLACK RHINOCEROS, LAYLA. THE TEAM WAS ABLE TO IDENTIFY A SOFT TISSUE GROWTH WITHIN HER SINUS THAT WAS IMPEDING ON HER AIRWAY, BUT COULD NOT DEFINITIVELY STATE HOW SEVERE THE IMPEDANCE WAS WITHOUT A MODEL. THIS PROMPTED A MOVEMENT BY VETERINARIANS ACROSS THE COUNTRY TO GATHER A THOROUGH DATABASE OF RADIOGRAPHIC IMAGES OF VARIOUS EXOTIC SPECIES. THIS DATABASE BECAME KNOWN AS THE ZOO AND AQUARIUM RADIOLOGY DATABASE, OR ZARD. THE GOAL OF ZARD IS TO DEVELOP A COLLECTION OF APPROXIMATELY 10,000 RADIOLOGIC IMAGES ACROSS 500 SPECIES. PRACTITIONERS WILL BE ABLE TO SEARCH THE DATABASE BY SPECIES, ANATOMICAL LOCATION, AGE, AND SEX. ALL IMAGES ARE DEVELOPED WITH THE AID AND APPROVAL OF BOARD-CERTIFIED VETERINARY RADIOLOGISTS TO ENSURE ACCURACY.

THE DEVELOPMENT OF ZARD MARKS A HUGE ADVANCEMENT IN ZOOLOGICAL MEDICINE. IT PROVIDES AN EDUCATIONAL RESOURCE FOR VETERINARY PROFESSIONALS AND A DEFINITIVE BASELINE FOR DIAGNOSTIC IMAGING IN OUR ZOO AND AQUATIC SPECIES. IF YOU ARE INTERESTED IN EXPLORING THE ZARD DATABASE, YOU CAN REQUEST ACCESS AT THE FOLLOWING LINK: HTTPS://WWW.BROOKFIELDZOO.ORG/ZARD.



NTS Word Search!

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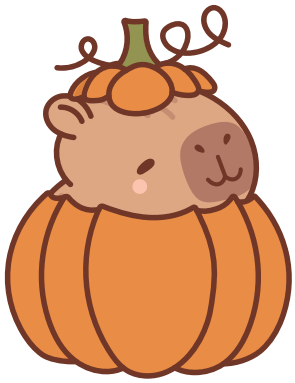
GERBIL
AXOLOTL
HAMSTER
KINKAJOU
FENNECFOX
FERRET
BOXTURTLE
HEDGEHOG
CHINCHILLA
SUGARGLIDER
GUINEAPIG
GECKO
COCKATIEL

BY: GRANT NICKOLSON



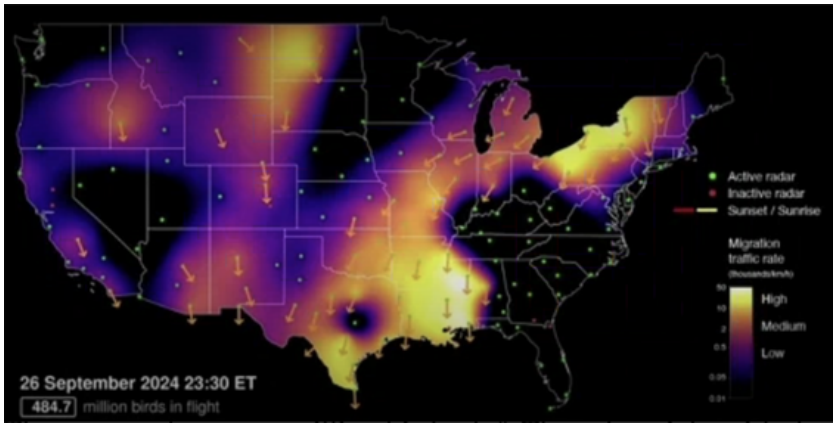
THE IMPACT OF HURRICANES HELENE & MILTON ON MIGRATING BIRDS

BY: TONI KIM

HURRICANE HELENE RAVAGED AN 800 MILE PATH OF DESTRUCTION ACROSS THE CAROLINAS, TENNESSEE, GEORGIA, FLORIDA, AND OTHER SOUTHEASTERN STATES CAUSING DAMAGE TO OVER TWO MILLION HOMES AND EVEN THE LOSS OF HUMAN LIFE. HUMANS WERE NOT THE ONLY SPECIES AFFECTED HOWEVER, AS THE TOLL ON WILDLIFE IN THESE AREAS HAS ALSO BEEN IMMENSE. AMONG MANY ANIMALS, DISPLACED EASTERN HELLBENDERS, THE LARGEST SALAMANDER IN NORTH AMERICA, AND THE INTERRUPTION OF AN ESTIMATED 150-275 AVIAN SPECIES IN THE MIDST OF MIGRATION ARE SAID TO HAVE BORNE THE GREATEST BRUNT OF THE DAMAGE. HELLBENDERS WERE SWEPT AWAY FROM THEIR TYPICAL HABITAT OF CREEKS AND RIVERS BY FLOODWATERS AND UNABLE TO RETURN, DRIED OUT, AND PERISHED AFTER THE WATERS RECEDED. OUR AVIAN SPECIES CONVERSELY HAVE THE ABILITY TO FLY AND ARE GENERALLY MORE EQUIPPED TO ADAPT TO AN APPROACHING NATURAL DISASTER BUT DO NOT ALWAYS EMERGE UNSCATHED. MANY THRUSH, WARBLER, HERON, AND OTHER SPECIES OFTEN SEEN IN THE WMC UTILIZE THE ATLANTIC FLYWAY FOR THEIR MIGRATORY JOURNEY AND BELONG TO THE GROUP AFFECTED BY THE RECENT HURRICANES (YOU CAN READ MORE ABOUT FLYWAYS IN THE ASSOCIATION OF AVIAN VETERINARIANS' BLOG POST WRITTEN BY OUR VERY OWN WMC MANAGER TYSON JENKINS HERE.)

DURING HURRICANE HELENE, THE CORNELL LAB OF ORNITHOLOGY'S BIRDCAST BIRD MIGRATION MAP SHOWED AN IMMENSE, BLACK HOLE OVER THE PATH OF THE STORM INDICATING THAT MOST IF NOT ALL THE BIRDS IN THE AREA HAD PAUSED THEIR MIGRATORY JOURNEY, INSTEAD CHOOSING TO HUNKER DOWN IN AN ATTEMPT TO RIDE IT OUT. WHETHER SHELTERING IN NATURAL OR MANMADE COVER, THINK TREE STUMP VS SOFFIT OF A BUILDING, MANY BIRDS CAN BE SWEPT UP BY WIND CURRENTS AND BROUGHT OUT TO THE OCEAN, BECOME EXHAUSTED AND FALL OR ARE PUSHED INTO THE WATER. OFF THE GULF COAST, CRUISE GOERS OUTSIDE THE PATH OF THE STORM HAVE REPORTEDLY RUN INTO CHAOTIC SWARMS OF MIGRATORY WARBLERS TRYING TO TAKE SHELTER THAT BECOME DISORIENTED BY THE LIGHTS OF THE SHIP AT NIGHT. MANY OF THESE BIRDS DIE OF EXHAUSTION OR SUFFER COLLISION TRAUMA. THERE ARE VIDEOS OF THIS PHENOMENON AVAILABLE ONLINE, BUT WARNING, SOME MAY FIND IT DISTURBING TO VIEW. BIRDS ON THE OPPOSITE SIDE OF THE STORM ARE SWEPT OFF COURSE INNLAND BUT CAN EVENTUALLY MAKE THEIR WAY BACK ON ROUTE. IF THE SPECIES DEPENDS ON SALTWATER PREY OR HAVE INSUFFICIENT BODY STORES, MANY WILL NOT HAVE ENOUGH SUSTENANCE TO FUEL THEIR DETOUR AND PREMATURELY PERISH.

NEVERTHELESS, ALL EFFECTS OF THE HURRICANES WERE NOT NEGATIVE, AS THE CORNELL LAB OF ORNITHOLOGY'S BIRDCAST BIRD MIGRATION MAP ALSO DOCUMENTED MORE THAN HALF A BILLION BIRDS IN THE MISSISSIPPI AND CENTRAL FLYWAYS RIDING THE WINDS OF THE STORM AIDING THEIR MIGRATION SOUTH. ADDITIONALLY, THE MAP DOCUMENTED THAT BIRDS EARLIER ON IN MIGRATION TURNED WEST AFTER MICHIGAN AVOIDING THE ATLANTIC FLYWAY AND CONTINUING THEIR JOURNEY SOUTH WHILE AVOIDING THE AREA OF CONCERN. WE CAN ONLY HOPE THE DETOUR DID NOT COST THEM A SIGNIFICANT AMOUNT OF ENERGY STORES AND THAT THEY ARE ABLE TO REACH THEIR DESTINATION.



CITATIONS

ARTICLE 1

HTTPS://WWW.PHEASANT.COM/RESOURCES/AVIAN-DIGESTIVE-SYSTEM
HTTPS://LAFEBER.COM/PET-BIRDS/ANATOMY-OF-THE-AVIAN-HEART/
HTTPS://LAFEBER.COM/VET/AVIAN-ANATOMY-BASICS/
HTTPS://WWW.INTECHOPEN.COM/CHAPTERS/79782
AVIAN CARDIOLOGY LECTURE BY DR. STEPHANY LEWIS

ARTICLE 2

BLACK RHINOCEROS AT BROOKFIELD ZOO UNDERGOES PORTABLE CT SCAN. IMAGING TECHNOLOGY NEWS.
(2021, OCTOBER 3). HTTPS://WWW.ITNONLINE.COM/ARTICLE/BLACK-RHINOCEROS-BROOKFIELD-ZOO-
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HTTPS://WWW.AVMA.ORG/NEWS/RADIOLOGY-DATABASE-PROVIDES-THOUSANDS-NONTRADITIONAL-
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MCCAFFERTY, C. (2024, SEPTEMBER 27). ZOOS AND AQUARIUMS COLLABORATE TO LAUNCH FIRST NATIONAL
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-IMAGES

ARTICLE 3

HTTPS://WWW.USATODAY.COM/STORY/GRAPHICS/2024/09/29/HURRICANE-HELENE-DAMAGE-MAPS/75440587007/ HTTPS://WWW.FWS.GOV/MEDIA/MIGRATORY-BIRD-FLYWAYS-NORTH-AMERICA HTTPS://WWW.POST-GAZETTE.COM/LIFE/OUTDOORS/2024/09/27/HURRICANE-HELENE-MASS-BIRD-MIGRATION-ORNITHOLOGY/STORIES/202409270141
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