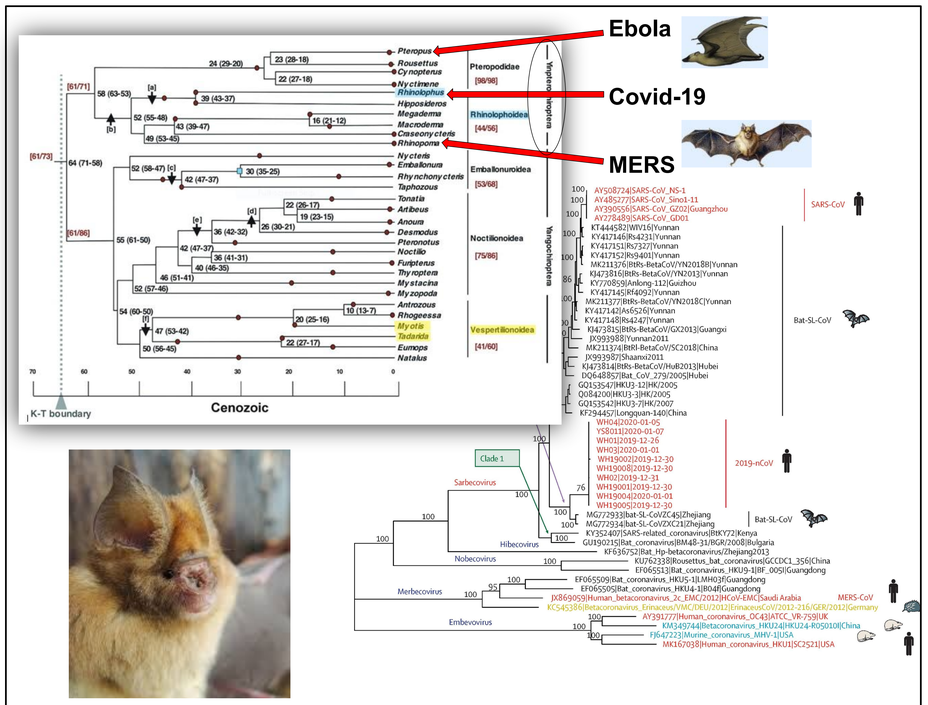
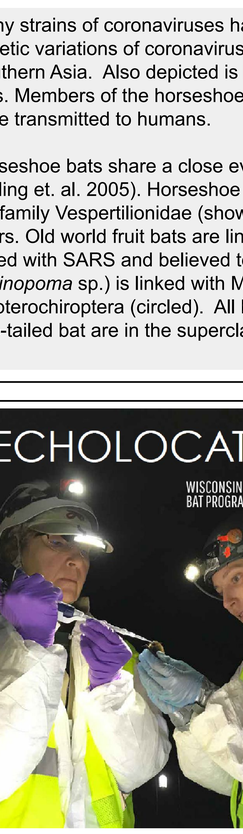
University of Wisconsin-Stevens Point

The Effect of Covid-19 on Bat Research in Wisconsin; Coughing Tiger Hidden Dragon

Nicole Dahlman & Kayla Guenther Faculty Advisor: Dr. Chris Yahnke

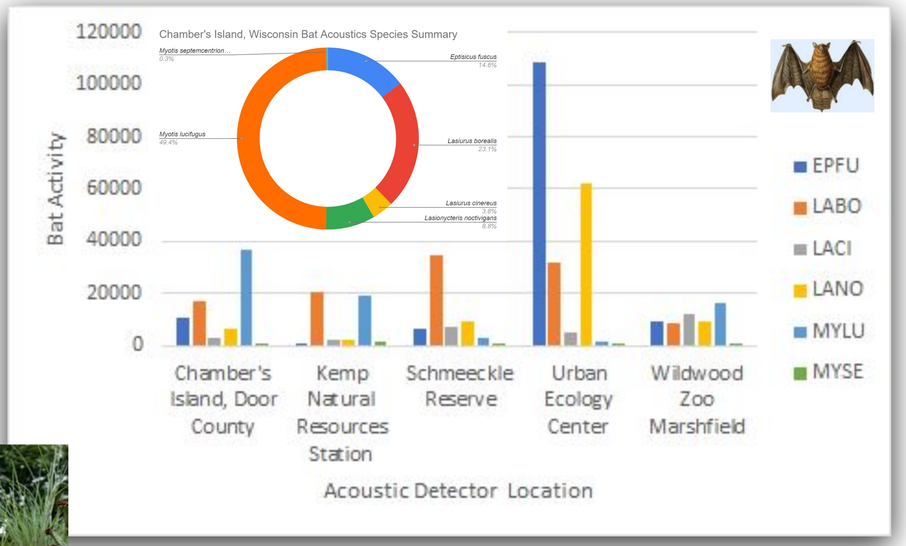


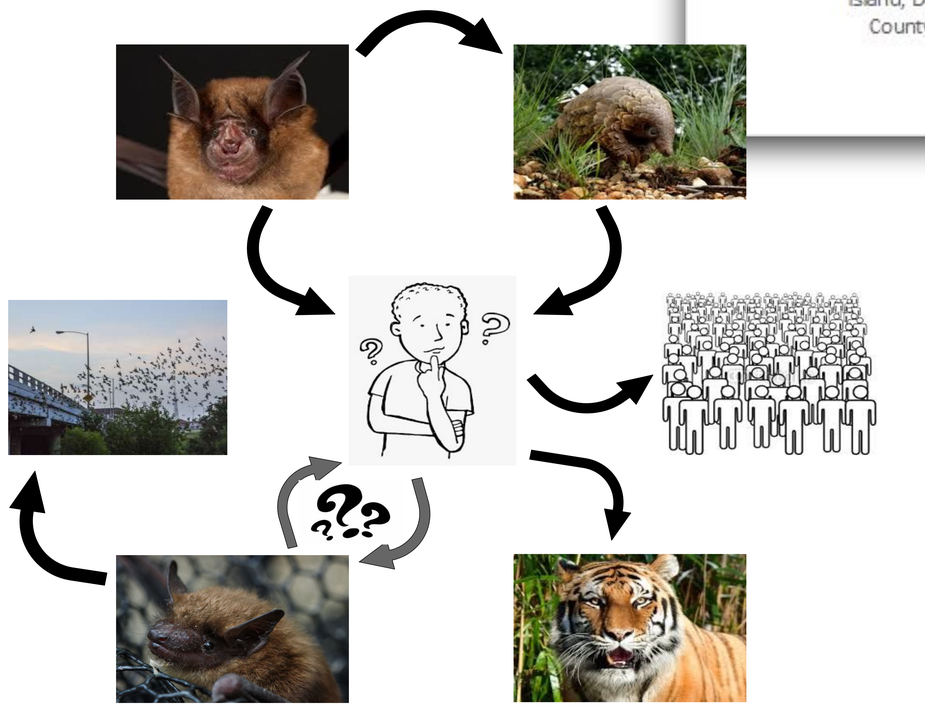


Many strains of coronaviruses have been isolated from bats (lower figure from Lu et. al. 2020). The genetic variations of coronavirus (CoV) include SARS, MERS, and Covid-19, all of which emerged in Southern Asia. Also depicted is Bat-SL-CoV, which are SARS-like coronaviruses that developed in bats. Members of the horseshoe bats, Rhinolophoidea, are reservoirs for all strains that eventually were transmitted to humans.

Horseshoe bats share a close evolutionary relationship with old world fruit bats (upper figure from Teeling et. al. 2005). Horseshoe bats (*Rhinolophus* sp. - shown in blue) and North American bats like the family Vespertilionidae (shown in yellow) have not shared a common ancestor in over 50 million years. Old world fruit bats are linked with Ebola in parts of Asia and Africa. The horseshoe bat is linked with SARS and believed to be linked with Covid-19 in China. The lesser mouse-tailed bat (*Rhinopoma* sp.) is linked with MERS in Africa and Saudi Arabia. All of these are in the superclade Yinpterochiroptera (circled). All bats in North America, like the little brown bat and the mexican free-tailed bat are in the superclade Yangochiroptera.

Humans were initially infected with Covid-19 either directly through contact with urine and feces of a horseshoe bat (top-left) or through an intermediate species like a pangolin (top-right). Since then, the primary transmission of Covid-19 has been person-to-person, having rapidly spread throughout the world. Recently, a Malayan tiger at the Bronx Zoo (bottom-right) tested positive for Covid-19 after coming into contact with an infected zookeeper. The concern is whether humans can spread the coronavirus to North American bat species such as the little brown bat (bottom-left), and whether they could then transmit the virus back to humans or to other species like the mexican free-tailed bat (middle-left: depicts summer-roosting colony in Austin, Texas).





Bat stations deployed around the state of Wisconsin collect acoustic data and is much less invasive than hands-on bat research. Acoustic studies would not be affected by the proposed ban on bat research.

Results illustrate how bat communities differ around the state. For example, the Urban Ecology Center in Milwaukee has a high number of big brown bats and silver-haired bats, whereas no single bat species dominates the community at the Wildwood Zoo in Marshfield (detector pictured below).

A detector hosted by a private landowner on Chamber's Island in Door County recorded more little brown bats in two months during the summer of 2019 than other parts of the state recorded in 10 years. The ring graph above illustrates the bat community at Chamber's Island is dominated by little brown bats - a species with declining populations elsewhere in the state due to white-nose syndrome. Other acoustic surveys include walking surveys with portable bat detectors and roost counts. For example, a bat survey near the Fletcher house on Chamber's Island revealed an active bat box as evidenced from fresh guano. There was a presence of both little brown bats and northern myotis bats flying near the house.

White-nose syndrome has been a major concern for bat researchers since its emergence in North America in 2006. Researchers take extensive precautions to ensure the fungus is not passed between bats while collecting data. This personal protection equipment (PPE) is also used to protect researchers from contracting illnesses like rabies from bats. Researchers wear disposable gloves on top of thicker, more protective gloves. The workstation and equipment are wiped down with disinfectants between each bat sampled.

To protect bats from contracting Covid-19, researchers should also wear disposable surgical masks when handling bats. If a researcher suspects they are Covid-19 positive, they should not be in the field. The opportunity for transmissions of the coronavirus to bat populations is low - and does not warrant suspension of bat research. Images from the Echolocator (*March 2020, Volume 9 Issue 1*)