Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Third Year) Subject: Zoology Course Code: ZOC 110 Course Title: Parasitology Unit: 06 Module Name: A brief account of Parasitic vertebrates: Vampire bat Name of the Presenter: Ms. Karishma Vaman Naik

Notes:

INTRODUCTION

Vampire bats, are leaf-nosed bats found in Central and South America belonging to the family Phyllostomidae and subfamily Desmodontinae. Their food source is blood that is they are hematophagic. Three extant hematophagic bat species include: the common vampire bat (*Desmodus rotundus*), the hairy-legged vampire bat (*Diphylla ecaudata*), and the white-winged vampire bat (*Diaemus youngi*). These three species are the only mammals that have evolved to feed exclusively on blood (hematophagy) as micropredators. Vampire bats are known to have roamed this world about 6-8 million years ago. From fossil records, it can be concluded that long ago there used to be more species of vampire bats, but as of now, there are only three, *Desmodus rotundus* being the most common.

DISTRIBUTION AND HABITAT

All three species of Vampire bat are native to America but are also distributed in Northern Mexico, Central Chile, Argentina and Uruguay as well as on the islands of Margarita and Trinidad off northern Venezuela.

They can only survive in warm climate, dry or humid, and are usually found in tropics and subtropics. They dwell completely dark places, in lodgings such as caves, mines, tree hollows and occasionally abandoned buildings. As for their conservation status, common vampire bats are not endangered population; in fact, their numbers have increased because of more livestock in South America.

MORPHOLOGY

The vampire bats have short, conical muzzles and pointed ears. The common vampire bat has greyish-brown fur, dorsally demarcated by darker fur and has lighter underparts. The wing span averages 350-400mm and the head and body length is usually 70-90mm. Adults usually weigh from 15-50 grams. Females are usually larger than males. The lower lip is deeply grooved. Dental features include only 20 teeth, the largest being the 2 chisel-like upper incisors and the 2 upper canines. The incisors are specialized for cutting and remain razor sharp due to lack of enamel. The inferior colliculus, the part of the bat's brain that processes sound, is well adapted to detect the regular breathing sounds of sleeping animals. Vampire bat has no tail and the membrane between the hind legs, called the uropatagium, is reduced. A well-developed clawed thumb on each wing is used to climb the prey and assist the animal in take-off. In contrast to other bats, which can only crawl helplessly on their belly with outstretched wings, the Vampires are as agile as any other quadruped. When walking, their wings are folded tightly in fan-like fashion and serve as forelimbs, while the hindlimbs are directed backwards, and the whole body is raised about 2 inches above the ground.

ECOLOGY AND BEHAVIOUR

Vampire bats prefer to live in colonies in almost completely dark places, such as caves, old wells, hollow trees, and buildings. Vampire bat colony numbers can range from single digits to hundreds in roosting sites. Social structure of roosting bats is made of female groups and their offspring, a few adult males, known as "resident males", and a separate group of males, known as "nonresident males". They are reproductively active throughout the year. Females have a gestational period of 7 months and give birth to one offspring at a time. The parental care is given by the female.

They are protective of their host and will fight off other bats while feeding. Not more than two bats can be seen feeding on the same host with the exception of the mothers and their offspring. The vampire bats have a complex social relationship. They form friendship like grooming relationship they have a fascinating food sharing behaviour also. Vampire bats do not put on fat. They can starve even if they miss two meals. It is interesting that other bat regurgitates the blood meal just as a mother bird regurgitates the food for the young ones.

PARASITISM

The vampire bat feeds primarily on the mammalian blood (Sanguivorous) particularly of livestock such as cattle and horses. Vampire bats hunt at night using Echolocation and olfaction to track the prey. When bat selects a target, it lands on it. They target the rump, flank or neck of its prey.

Heat sensors (thermoception) in the nose help to detect blood vessels near the surface of the skin of the host. Vampire bats use infrared radiation to locate blood hotspots on their prey. There it might first clip off some of the hair to clear a small space and pierces the skin with its teeth biting away a small flap of about 7X4 mm and 1-5 mm deep and laps up the blood with its tongue which darts in and out of the mouth like a piston and has lateral grooves adapted for the purpose.

Thus, the Vampire bat does not suck the blood with its mouth, as was popularly believed, but licks it up with its tongue. The bat may take up from 16 to 50 ml of blood during its meal. The bite of the Vampire is so painless that the victim is not disturbed during the repast, the only evidence of which may be provided by blood stains. Having gorged itself, the Vampire flies away to a sheltered place, such as a cave or hollow tree, where it spends the day hanging head downwards and digesting its food.

The blood does not clot because of an anticoagulant secreted in the saliva while sucking the blood and allows it to feed without interruption for about 30 minutes. The unique properties of the vampire bats saliva have been found in medicine. A genetically engineered drug "Desmoteplase" nicknamed as "Draculin" is used as an anticoagulant and has been shown to increase blood flow in stroke patients.

The anatomy and physiology of bat is modified to support its feeding. Rapid processing and digestion of the blood enables it to take flight soon after the feeding. The water in the blood meal is absorbed by stomach and intestine rapidly. Water is quickly transported to the kidneys, and to the bladder for excretion resulting in urination within two minutes of feeding. Shedding the blood's liquid facilitates quick flight take-off. Vampire bats play an important role in the spread of at least two types of trypanosomiases among domestic ungulates of Latin America. Infection of humans by rabies from vampire bat bites is rare but has been documented; for example, in 2010 four children in Peru died after being bitten. The highest occurrence of rabies in vampire bats occurs in the large populations found in South America. However, the risk of infection to the human population is less than to livestock exposed to bat bites. Only 0.5% of bats carry rabies, and those that do may be clumsy, disoriented, and unable to fly.