**Status of Mice in bangladesh**



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 **September, 2015**

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**The Author**

 **LIST OF ABBREVIATION**

**List of Abbreviations and Symbols**:

|  |  |
| --- | --- |
| < | = Less than |
| > | = Grater than |
| ≤ | = Less than or equal |
| ≥ | = Greater than or equal |
| Fig | = Figure |
| CVASU | = Chittagong Veterinary and Animal Sciences University |
| in. | = Inches |
| cm. | = centimeter |
| gm. | = Gram |
| Mm | = Milimeter |
| °C | = Degree celcious |
| LCM | = Lymphocytic choriomeningitis |
| LPT | = lAparotomy |
| Ml | = Mililitter |
| ID | = Identification |
|  e.g. | = example |
| i.e. | = that is |
| NARC | = National Agricultural Research Centre |
| Mice | = Plural form of mouce |
| G.P. | = Gestation Period |
| E.C. | = Estrous cycle |
| TBDs | = Tick-borne Disease |

 **ABSTRACT**

The study on “Present Status of Mice in Bangladesh” was done to know the no. of species; habitation & breeds of mice in Bangladesh, their behavioral & physiological characters ;and their common diseases,treatment & prevention.There are about 38 species of mice found in the world. . The best-known mice [species](http://en.wikipedia.org/wiki/Species) are the [black mice](http://en.wikipedia.org/wiki/Black_rat) /House mice-*Mus musculus*. Bangladeshi mice are commonly *Mus musculus* .. Mice have an adult body length (nose to base of tail) of 7.5–10 cm (3.0–3.9 in) and a tail length of 5–10 cm (2.0–3.9 in). The weight is typically 10–25 g. Wild mice are as different from house mice . They rarely bite and stay clean by grooming themselves. Most house mice,live in crivicesin rocks,woodpiles of debris,and in shedsbarns,crawlspaces and garages,wherever they can hide that”s near a source of food. If there is no other suitable shelter,they may dig complex burrows,these are nocturnal animals, the pet ones are happy to sleep during the day while their owner,is at work or school.In nature mice are largely harbivores,consuming any kind of fruit or grain from plants and [animal](http://a-z-animals.com/reference/glossary/#Animal) matters. House mice primarily feed on plant matter, but are [omnivorous](http://en.wikipedia.org/wiki/Omnivore)... They may [eat their own faeces](http://en.wikipedia.org/wiki/Coprophagia) to acquire nutrients produced by [bacteria](http://en.wikipedia.org/wiki/Bacteria) in their intestines. House mice, like most other rodents, do not [vomit](http://en.wikipedia.org/wiki/Vomiting). Mice are sexually dimorphic. Breeding onset is at about 50 days of age in both females & males. Females may have their first estrus at 25-40 days.House mice have a polygynous mating system Spring is the most active season for mice breeding. Mices are fast breeders and give birth to a litter of 3–14 young (average six to eight). One female can have 5 to 10 litters per year .The average litter size is 10-12 during optimum production**.** Gestation period is 20 days. Weaning age 18 -28 days of age. The life span of a mouse is usually 9 to 12 months Now-a-days, mices are commonly kept as pets all over the world. Pet mice pretence the same health risks to humans as other household animals so. Common diseases of mice such as Skin wounds, ulcerative dermatitis, abscesses or tumors; Abdominal enlargement,ascites, distended urinary bladder;Abnormal posture,Myocardial degeneration; Arteritis etc. For prevention of mice diseases some vaccine is available for some specific diseses.

**Key words:** Mice, Body length , Mating system, Nocturnal, Omnivorous animal, Sexually dimorphic,,Weaning age, Gestation period ,Litter size , Life spa

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**CHAPTER – 1**

 **INTRODUCTION**

A mouse (plural: mice) is a small [rodent](https://en.wikipedia.org/wiki/Rodent) characteristically having a pointed snout, small rounded ears, a body-length scaly tail and a high breeding rate. There are about 38 species of mice.The best known mouse species is the common [house mouse](https://en.wikipedia.org/wiki/House_mouse) (*Mus musculus*).The other Subspecies are Mus musculus bactrianus,Mus musculus castaneus,Mus musculus *gentilulus,*Mus musculus *musculus* Scientific classification of mice is Kingdom Animalia , Phylum Chordata ,Class Mammalia, Order Rodentia , Family *Muridae ,* Sub. Family *Murinae,* Genus *Mus,* Species  *M. musculus.*Mice is also a popular [pet](https://en.wikipedia.org/wiki/Pet). In some places, certain kinds of  field mice are locally common. They are known to invade homes for food and shelter.[Domestic mice](https://en.wikipedia.org/wiki/Fancy_mouse) sold as pets often differ substantially in size from the common house mouse. This is attributable both to breeding and to different conditions in the wild. Mice have an adult body length (nose to base of tail) of 7.5–10 cm (3.0–3.9 in) and a tail length of 5–10 cm (2.0–3.9 in). The weight is typically 10–25 g . In the wild they vary in color from light to dark [agouti](http://en.wikipedia.org/wiki/Agouti_%28coloration%29) (light to dark brown) but domesticated fancy mice and laboratory mice are produced in many colors ranging from white to champagne to black. The ears and tail have little hair. The voice is a high-pitched squeak. The tail is used for balance when the mouse is climbing or running, or as a base when the animal stands on its hind legs and to convey information about the dominance status of an individual in encounters with other mice. House mice are nocturnal,but may sometimes go out in daytime..They don”t go farther then they need to obtain food.They don”t stray far from their familiar territory & routinely travel the same route,usually no more than about 30 feet in diameter. House mice make soft twittering & squeaking sounds to each other in their nest. House mice like all other rodents constantly gnaw on things.House mice are active year around, they don”t hibernate.They can become more of a problem for humans in winterbecause they try to move inside buildings for wormth and food.House mice usually run, walk, or stand on all fours, but when eating, fighting, or orienting themselves, they rear up on their hind legs with additional support from the tail-a behaviour known as "[tripoding](http://en.wikipedia.org/wiki/Tripoding)”In nature mice are largely harbivores,consuming any kind of fruit or grain from plants. Food intake is approximately 15g per 100g of body weight per day; water intake is approximately 15ml per 100g of body weight per day.House mice live throughout the country,although they tend to not inhabit deserts or forests. House mice are typically commensal & are found in a very wide rangeof man made habitats including houses,farm.outbuildings other types of buildings & even coal mines & frozen meat stores.The visual apparatus of mice is basically similar to that of humans but differs in that they are [dichromats](http://en.wikipedia.org/wiki/Dichromacy) and have only two types of [cone cells](http://en.wikipedia.org/wiki/Cone_cells) whereas humans are [trichromats](http://en.wikipedia.org/wiki/Trichromacy) and have three.House mice also rely on [pheromones](http://en.wikipedia.org/wiki/Pheromone) for social communication, some of which are produced by [preputial glands](http://en.wikipedia.org/wiki/Preputial_gland) of both sexes.Mice can sense surfaces and air movements with their [whiskers](http://en.wikipedia.org/wiki/Vibrissae) which are also used during [thigmotaxis](http://en.wikipedia.org/wiki/Thigmotaxis).Breeding onset is at about 50 days of age in both females & males, females may have their first estrus at 25-40 days.mice are polyestrus & breed year year round;ovulation is spontaneous.the duration of the estrus cycle is 4-5 days & estrus itself last about 12 hours,occurring in the evening. The average gestation period is 20 days. The average litter size is 10-12 during optimum production,but is highly strain-dependent.The young are called pups & weight 0.5-1.5 gm.at birth,are hairless & closed eyelids & ears. Newborn male mice are are distinguished from new born females by noting the greater anogenital distance & large genital papilla in the male.Mice usually live less than one year in the wild and in protected environments, however, they often live two to three years. House mice can sometimes transmit diseases, contaminate food and damage food packaging. se. Lymphocytic choriomeningitis (LCMV) can be transmitted by mice House mice are not usually a vector of human plague (bubonic plague) because they have less infestations with fleas than do mice. They arebreeding age is about6-8 weeks**,**Oestrus cycle length:4-5 days ,First Oestrus: 25-28 day,Duration of Pregnancy: 18–21 days ,Weaning age: 21-28 days. Litter size of Mice is 5 to 10. Where house mice are abundant they can consume huge quantities of grains, making these foods unavailable to other (perhaps native) animals. House mice are also important prey items for many small predators**. Species (or larger taxonomic groups) used as hosts by this species.**They can be tamed and reared as ornamental purposes**.**

* **The Main objectives of the study are as follow:**
1. To study the common biophysical characteristics.
2. To address some fundamental questions of ecology,using reference studies in an environment largely untouched by civil
3. To analyze their feeding & nutrition
4. To know the breeding chaeacteristics & gestation period of mice
5. To analyze the communitiesn primeval habitats as reference for the assessment of anthropogenic impact on species communities in Bangladesh.
6. To determine the extent & location of existing habitat suitable for meeting the habitat requirements of individual populations of priority species groups.
7. To know the common disease & prevention in case of mice.

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**CHAPTER – 2**

**METHODS AND MATERIALS**

**Study area:** The study was conducted in some area in Bangladesh as per convenience.Different areas, like Patiya, chandanaish,khulshi of chittagong, Dhaka etcwas visited due to internship placements. So there was a great chance for study and getting reported on mice.

**Taking photographs for knowing phenotypic and behavioral characteristics of mice:** It was a very difficult task to taking photographs of a mice. Because they don”t stay steadily for moment. They are speedy racer , intelligent and sometimes afraid of a slight sound because there hearing capability is more then other animal. Moreover they are nocturnal in native.

**Browsing internet & webs:** There are many web sites is available about mice. Some journals also available with various study or experiment on mices . There are some books on mice also written by some interested author .

Studying the printed materials like: mice related journals,published magazines,books etc.

**Direct observation on mices:**  Many interesting information about mice, like their body characteristics habitats, feeds and feeding, breeding, diseases, treatment were found.

**CHAPTER: 3**

**RESULT AND DISCUSSION**

* **Geographic Range**

Mus musculus was originally a Palaearctic species, but through its close association with humans it has been widely introduced across the globe (Musser and Carleton,2005).The species is widespread over all continents, except Antarctica, and has become established in North and South America, sub-Saharan Africa, Australia, and many oceanic islands (Macholán 1999).Native: Afghanistan; Albania; Algeria; Andorra; Armenia (Armenia); Austria; Argentina; Australia Azerbaijan; Bahrain; Belarus; Belgium; Bosnia and Herzegovina; Bulgaria; Croatia; Czech Republic; Denmark; Egypt; Eritrea; Estonia; Faroe Islands; Finland; France; Georgia; Germany; Gibraltar; Greece; Holy See (Vatican City State); Hungary; Iceland; India; Iran, Islamic Republic of; Iraq; Ireland; Israel; Italy; Japan; Jordan; Kazakhstan; Korea, Nepal; Netherlands; Norway; Oman; Pakistan; Palestinian Territory, Occupied; Poland; Portugal; Romania; Russian Federation; Serbia (Serbia); Slovakia; Slovenia; Spain; Sweden; Switzerland; Syrian Arab Republic; Tajikistan; Tunisia; Turkey; Turkmenistan; Ukraine; United Arab Emirates; United Kingdom; Uzbekistan; Yemen Uruguay; Venezuela, Bolivarian Republic of; VietNam

* **Table 1 : Some important physical characteristics of Mice**

|  |  |  |
| --- | --- | --- |
| 1 | Body length | 7.5 -10 cm. |
| 2 | Coat color **:** Wild mice Domesticated fancy and laboratory mice |  light to dark brown white to champagne to black |
| 3 | Voice  |  high-pitched squeak |
| 4 | Body weight | 10–25 g |
| 5 | Tail  | 2 -4 inches long |
| 6 | Eye |  Small & hairless |
| 7 | Ear | Moderately large ears |

* **Table 2 :Some important physiological characteristics of Mice**

|  |  |  |
| --- | --- | --- |
| 1 | Sexual maturity: Male  Female | 6 -8 weeks 6 -8 weeks |
| 2 | Mating system | Polygynous |
| 3 | Litter size |  5 -10 / year |
| 4 | Weaning age | 18 -28 days of age |
| 5 | Breeding occurs | Throughout the year |
| 6 | Gestation period  |  20 days |
| 7 | Lifespan | 1 -3 year |

* **Table-2:Some Environmental characteristics of Mice**

|  |  |  |
| --- | --- | --- |
| 1 | Temparature |  16 -26 degree C  |
| 2 | Humidity | 40 -60 percent |

* **Behavioral characteristics of Mice :**

House mice are nocturnal,but may sometimes go out in daytime..They don”t go farther then they need to obtain food..They don”t stray far from their familiar territory & routinely travel the same route,usually no more than about 30 feet in diameter. This is what gives away their location when they move into our homes:they leave small,dark,1/4 inch droppingsalong their well-traveled path. Sometimes they live together.When they do,it”s usually in a group of one male, several females & they”ll

**Fig-1: Mice like to stay hidden place**

defend their home against outsiders. House mice make soft twittering & squeaking sounds to each other in their nest.House mice like all other rodents constantly gnaw on things. Gnawing is a must for them in order to keep their constantly growing incisor teeth filed down..House mice are active year around, they don”t hibernate.They can become more of a problem for humans in winterbecause they try to move inside buildings for wormth and food.

* **Habitat and Nesting**

House mice live throughout the country, although they tend to not inhabit deserts or forests. They are quite comfortable living around humans and sometimes happily move into our homes and offices. Some spend their entire lives in a buildings, where they live in walls, under major appliances, in storage boxes and drawers, and in upholstered furniture. Most house mice, though, live in crivicesin rocks, woodpilespiles of debris, and in shedsbarns, crawlspaces and garages, wherever they can hide that”s near a source of food. If their”s is no other suitable shelter, they may dig complex burrows. House mice usually live relatively close to buildings. Some live outdoors in summerand move indoors in the fall.

House mice are typically commensal & are found in a very wide range of man made habitats including houses, farm. outbuildings other types of buildings & even coal mines & frozen meat stores. Simetimes it is feral in areas where it has been introduced, and in some parts of its native range it maintains wild population in outdoor habitats such as arable land,pustures, coastal sand dunes, salt marshes and scrubby road verges(Macholan 1999,Wilson and reeder2005).House mice tend not to be found in forestsand deserts(Macholan 1999).Their home usually has separate areas: a “pantry” for stored food & a place for nesting. Nests are made from soft materials, such as finely shredded paper**/** cloth. A house mouse home will haveseveral access points,a convinence for entering, but also providing a quick exit if a predator comes around**.**

**Fig -2.:Habitats of mouse**

These animals are found in the following types of habitat : Temperate;  [terrestrial](http://www.biokids.umich.edu/critters/Mus_musculus/#20020904145794); Terrestrial Biomes; [for est](http://www.biokids.umich.edu/critters/Mus_musculus/#20020904145828) ; [scrub forest](http://www.biokids.umich.edu/critters/Mus_musculus/#20020904145677)

 .

* **Physical description of Mice:**

Mice have an adult body length (nose to base of tail) of 7.5–10 cm (3.0–3.9 in) and a tail length of 5–10 cm (2.0–3.9 in).The weight is typically 10–25 g .In the wild they vary in color from light to dark [agouti](http://en.wikipedia.org/wiki/Agouti_%28coloration%29) (light to dark brown) but domesticated fancy mice and laboratory mice are produced in many colors ranging from white to champagne to black..They have short hair and some, but not all, sub-species have a light belly. The ears and tail have little hair. The hind feet. are short compared [*apodemus*](http://en.wikipedia.org/wiki/Apodemus) mice, only 15–19 mm(0.59–0.75 in) long; the normal gait is a run with a stride of about 4.5 cm(1.8 in),though they can jump vertica. The voice is high-pitched squeak.

 . .

**Fig-3**:**Body coat of mice**

New-born males and females can be distinguished on close examination as the [anogenital distance](http://en.wikipedia.org/wiki/Anogenital_distance) in males is approximately double that of the female. From the age of about 10 days females have five pairs of [mammary glands](http://en.wikipedia.org/wiki/Mammary_gland) and [nipples](http://en.wikipedia.org/wiki/Nipple); males have no nipples. When sexually mature, the most striking and obvious difference is the presence of [testicles](http://en.wikipedia.org/wiki/Testicle) on the males. These are large compared to the rest of the body and can be retracted into the body.

The tail, which is used for balance, has only a thin covering of hair as it is the main peripheral organ of heat loss in [thermoregulation](http://en.wikipedia.org/wiki/Thermoregulation) along with  to a lesser extent  the hairless parts of the paws and ears. Blood flow to the tail can be precisely controlled in response to changes in ambient temperature using a system of [arteriovenous anastomoses](http://en.wikipedia.org/wiki/Arteriovenous_anastomosis) to increase the temperature of the skin on the tail by as much as 10 °C to lose body heat. The tail is also used for balance when the mouse is climbing or running, or as a base when the animal stands on its hind legs (a behaviour known as "tripoding"), and to convey information about the dominance status of an individual in encounters with other mice.

* **Feeding & Nutrition :**

House mice usually run, walk, or stand on all fours, but when eating, fighting, or orienting themselves, they rear up on their hind legs with additional support from the tail-a behaviour known as "[tripoding](http://en.wikipedia.org/wiki/Tripoding)”. They consuming any kind of fruit or grain from plants. They will eat any human food that is available as well as glue, soap, and other household materials. Many mice will gather and then store their food for later use. In the wild, mice eat many kinds of plant matter, including seeds, roots, leaves, and stems. They will also eat insects ([beetles](http://www.biokids.umich.edu/critters/Coleoptera/), [caterpillars](http://www.biokids.umich.edu/critters/Lepidoptera/), and cockroaches) and meat if it is available. However, mice adopt to well to urban areas & are known for eating almost all types of food scraps They will [eat their own faeces](http://en.wikipedia.org/wiki/Coprophagia) to acquire nutrients produced by [bacteria](http://en.wikipedia.org/wiki/Bacteria) in their intestines. In captivity mice are commonly feed commercial pelleted mouce diet. These diet are nutritionally complete, but they still need a large variety of vagitables. Food intake is approximately 15g per 100g of body weight per day; water intake is approximately 15ml per 100g of body weight per day. Primary diet is [omnivorous](http://www.biokids.umich.edu/critters/Mus_musculus/#20020904145763), anmal food like [carrion](http://www.biokids.umich.edu/critters/Mus_musculus/#20020913233224) ; insects ; terrestrial non-insect arthropods, Plant Foods like leaves ; rootsand tubers;  wood, bark, or stems ;seeds, grains, nuts ; fruit and have Foraging Behavior.

* **Senses and communication**

**Vision :** The visual apparatus of mice is basically similar to that of humans but differs in that they are [dichromats](http://en.wikipedia.org/wiki/Dichromacy) and have only two types of [cone cells](http://en.wikipedia.org/wiki/Cone_cells) whereas humans are [trichromats](http://en.wikipedia.org/wiki/Trichromacy) and have three. However, the [ventral](http://en.wikipedia.org/wiki/Ventral) area of the mouse [retina](http://en.wikipedia.org/wiki/Retina) has a much greater density of [ultraviolet](http://en.wikipedia.org/wiki/Ultraviolet)-sensitive cones than other areas of the retina, although the biological significance of this structure is unknown.

**Olfaction :** House mice also rely on [pheromones](http://en.wikipedia.org/wiki/Pheromone) for social communication, some of which are produced by [preputial glands](http://en.wikipedia.org/wiki/Preputial_gland) of both sexes. Mice detect pheromones mainly with the [vomeronasal organ](http://en.wikipedia.org/wiki/Vomeronasal_organ) (Jacobson's organ), located at the bottom of the nose. The urine of house mice, especially that of males, has a characteristic strong odor. Odours from adult males or from pregnant or lactating females can speed up or retard sexual maturation in juvenile females and synchronise reproductive cycles in mature females (i.e. the [Whitten effect](http://en.wikipedia.org/wiki/Whitten_effect)). Odours of unfamiliar male mice may terminate pregnancies, i.e. the [Bruce effect](http://en.wikipedia.org/wiki/Bruce_effect).

**Touch :**Mice can sense surfaces and air movements with their [whiskers](http://en.wikipedia.org/wiki/Vibrissae) which are also used during [thigmotaxis](http://en.wikipedia.org/wiki/Thigmotaxis). If mice are blind from birth, super-normal growth of the vibrissae occurs presumably as a compensatory response, or if the vibrissae are absent, the use of vision is intensified.

**Fig -4 :** **A two-day-old mouce** **Fig-5 : A-2-week-old mouse, just about** .  **open its eye**

* **Breeds & Breeding**:

 Breeding onset is at about 50 days of age in both females & males. Sexual Maturity:1 month. Females may have their first estrus at 25-40 days.mice are polyestrus & breed year year round; ovulation is spontaneous.the duration of the estrus cycle is 4-5 days & estrus itself last about 12 hours,occurring in the evening. Vaginal smear is useful in timed mating to determine the stage of the estrus cycle.Mating is usually nocturnal & may be confirmed by the presence of a copulatory plug in the vagina upto the 24 hourss post copulation.the presence of smear on a vaginal smear is also a reliable indicator of mating. House mice have a polygynous mating system, where each male mates with multiple females. Males sing when they smell females who are ready to mate, which might attract females. Female mice housed together tend to go into anestrus & do not cycle. If exposed to a male mouce or the pheromones of a male mouce, most of the females will go into the estrus at about 72 hours. this synchronization of the estrus cycle is known as the Whitten effect. The exposer of a recently bred mouce to the pheromone of a strange male mouce may prevent implantation or pseudopregnancy,a pheromone is known as the Bruce effect. The average gestation period is 20 days. A fertile postpartum estrus occurs 14-24 hours following parturition simultaneous lactation & gestation prolons gestation3-10 days owing to delayed implantation.The average litter size is 10-12 during optimum production,but is highly strain-dependent.As a general rule inbreed mice tend to have longer gestation periods & smaller litters than outbreed & hybreed mice. The young are called pups & weight 0.5-1.5 gm.at birth,are hairless & closed eyelids & ears..Pups are weaned at 3 weeks of age; weaning weight is 10-12gm.Newborn male mice are are distinguished from new born females by noting the greater anogenital distance & large genital papilla in the male.This is best accomplished bylifting the tails of littermates & comparing perineums.Following copulation, female mice will normally develop a [copulation plug](http://en.wikipedia.org/wiki/Copulation_plug) which prevents further copulation. This plug stays in place for some 24 hours. The [gestation](http://en.wikipedia.org/wiki/Gestation) period is about 19–21 days, and they give birth to a litter of 5–10 young (average six to eight), so the mouse population can increase very quickly. Breeding occurs throughout the year. (However, animals living in the wild do not reproduce in the colder months, even though they do not [hibernate](http://en.wikipedia.org/wiki/Hibernation).The pups are born blind and without fur or ears. The ears are fully developed by the fourth day, fur begins to appear at about six days and the eyes open around 13 days after birth; the pups are weaned at around 21 days. Females reach sexual maturity at about six weeks of age and males at about eight weeks, but both can copulate as early as five weeks. If the infants live in high temperatured area from birth, they will become less-haired.

* **Life expectancy**

House mice usually live less than one year in the wild, due to a high level of [predation](http://en.wikipedia.org/wiki/Predation) and exposure to harsh environments. In protected environments, however, they often live two to three years.

* **BREEDING PARAMETERS:**

Breeding age of Male & Female is 6-8 weeks, Oestrus cycle length is 4-5 days First Oestrus at 25-28 days ,Duration of Pregnancy is 18–21 days, Weaning age is 21-28 days.

**Litter size of Mice :**

Mice give birth to a litter of 3–14 young (average six to eight). One female can have 5 to 10 litters per litter .The average litter size is 10-12 during optimum production, but is highly strain-dependent, so the mouse population can increase very quickly.

* **Predators of Mice :**

House mice are eaten by a wide variety of small predators throughout the world, including [cats](http://www.biokids.umich.edu/critters/Felis_silvestris/),[foxes](http://www.biokids.umich.edu/critters/Vulpes_vulpes/), [weasels](http://www.biokids.umich.edu/critters/Mustela/), [ferrets](http://www.biokids.umich.edu/critters/Mustela/), [mongooses](http://www.biokids.umich.edu/critters/Herpestidae/),large [lizards](http://www.biokids.umich.edu/critters/Squamata/), [snakes](http://www.biokids.umich.edu/critters/Squamata/), [hawks](http://www.biokids.umich.edu/critters/Accipitridae/), [falcons](http://www.biokids.umich.edu/critters/Falconidae/), and [owls](http://www.biokids.umich.edu/critters/Strigiformes/). House mice try to avoid predation by keeping out of the open and by being fast. They are also capable of reproducing very rapidly, which means that populations can recover quickly from predation.Commonly known Predators is domestic cats;red foxes;Weasels; ferrets; Mongooses; Large ligards; Snakes; Hawks; falcons; Owls etc.

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**Figure 6 : Predator of mice**

* **Prblems caused by mice:**

Mice contribute to the spread of several human and animal diseases, including bubonic plague, Lymphocytic choriomeningitis (LCMV), Leptospirosis, allergies, asthma etc. They also carry a virus that may contribute to breast cancer in humans. Where abundant, house mice consume large quantities of crops and contaminate foods with their droppings. They can destroy woodwork, furniture, upholstery, and clothing.Ways that these animals might be a problem for humans are injures humans ; carries human disease ; crop pest ; household pest

* **Common disease of Mice**

Skin wounds, usually ulcerative dermatitis; Superficial or external mass lesions, usually abscesses or tumors; Abdominal enlargement, usually from organomegaly such as enlarged uterus, kidney or liver, or excessive fluid in the abdomen (ascites), possibly a distended urinary bladder; Abnormal posture, e.g. hunched posture or head tilt;Abnormal activity e.g. reduced activity, posterior weakness, spinning, rolling, seizures; wasting, or obesity. malocclusion and hydrocephalus are life threatening conditions that should be identified at or before weaning. Microphthalmia systemic amyloidosis, severe renal disease, acidophilic macrophage pneumonia, and Dental disease or periodontal disease; Periodontal inflammation involving molar teeth, Primary tumors of the teeth such as odontomas Malocclusion, incisor overgrowth Cardiomyopathy, Myocardial degeneration; Arteritis, Cardiac thrombi (intravascular blood clots that form in vivo) usually involve the left atrium in mice etc..

* **Prevention of Mice** **diseases:**

There is no actual method for prevention is present for mice diseases but some vaccine is available for some specific diseses. Like feeding of trichinella infected larvae by gavage(630) or by i/m (0.1 larvae/g), for Yoshida ascites sarcoma intracaecal inj. (.5ml ascities fluid) Or laparotomy is done under ether anaesthesia, for rodent hookworms *(Nippostrongy* *brasiliensis*) is by protected soperoxide dismutase, Hartz flea and tick shampoo & sebolux shampoo is used for tick and fly.

CHAPTER: 4

### CONCLUSION

The genus *Mus* emerged from the Muridae family about 3.5 million years ago.Bangladesh mice’s are commonly *Mus musculus.* Mice live in human cities, suburbs, and agricultural areas in a human-dependent relationship called commensalism. . Wild mice live in colonies. Female mice, usually related to each other, live in little groups of one to six in a little burrow system of their own. They each have their own nest chamber, but they may share the burrow and may raise their young together (called [communal nesting](http://www.ratbehavior.org/CommunalNesting.htm)). Mice don't live long in the wild the average lifespan is probably less than a year. In one study, the researcher found that 95% of mice living at a farm were no longer alive 1.5 year later. So mice suffer very high mortality in the wild. The mice is a small scavenger mammal that has proved to be a pest in both urban and rural areas where mice are normally present due to an abundance of food. Mice are known to kill smaller livestock on farms. The mice can also carry and spread disease to a devastating effect although diseases carried by mice are generally not passed on to humans. However, in the middle ages, the black plague wiped out nearly two thirds of the European population. The disease was not caused by the mice directly but was actually caused by infected fleas carried on mice. Today, mice are commonly kept as pets all over the world and are thought to have been bred as pets since the 1800s. Pet mice pretence the same health risks to humans as other household animals so are not seen to carry harmful diseases. When tame, mice can be extremely friendly and can be taught to perform selective tasks such as doing certain actions in order to get food. They are especially good pets for apartment dwellers with limited space, and busy people, as long as you can spend at least 1/2 to 1 hour a day with your mice.

 **CHAPTER: 5**

 **LIMITATIONS**

* The study period was short.
* Mice always remain in hidden place from people
* Farmers were not cooperative during the study.
* No follow up done in the study period.
* This study is limited to certain parameters and some of the parts of the study were left untouched due to time and cost factors so that future researchers can elaborate this study by approaching the untouched portion.

 **REFERRENCES**

1. Jackson, H.H.T. 1961. Mammals of Wisconsin. The University of Wisconsin Press, Madison, Wisconsin.
2. Kurta, A. 1995. Mammals of the Great Lakes Region. The University of Michigan Press, Ann Arbor, Michigan.
3. Nowak, R.M. and J.L Paradiso. 1983. Walker's Mammals of the World. 4th edition. John Hopkins University Press, Baltimore, Maryland.
4. Holy, T., Z. Guo. 2005. Ultrasonic songs of male mice. *Public Library of Science, Biology*, 3/12. Accessed November 02, 2005 at <http://biology.plosjournals.org/perlserv/?request=get-document&doi=10.1371/journal.pbio.0030386>.
5. Indik, S., W. Günzburg, B. Salmons, F. Rouault. 2005. Mouse mammary tumor virus infects human cells. *Cancer Research*, 65 (15): 6651-6659.
6. Helge J. C. Lund 1957 ,Yoshida ascities sarcoma, British journal of cancer,vol. 11(3) , page no.475-477.
7. Sage, R., W. Atchley, E. Capanna. 1993. House mice as models in systematic biology. *Systematic Biology*, 42(4): 523-561.
8. Stewart, T., R. Sage, A. Stewart, D. Cameron. 2000. Breast cancer incidence highest in the range of one species of house mouse, Mus domesticus. *British Journal of Cancer*, 82(2): 446-451.
9. Berry, R. J., ed. 1981. *Biology of the House Mouse.* Symposium of the Zoological Society of London, No. 47. London: Academic Press.
10. Corrigan, R. M. 2011. Rats and mice. In A. Mallis, D. Moreland, and S. A. Hedges, eds. *The Mallis Handbook of Pest Control,* *10th ed*. Cleveland: GIE Publications, pp. 11-119.
11. Marsh, R. E., and W. E. Howard. 1981. *The House Mouse: Its Biology and Control.* Oakland: Univ. Calif. Agric. Nat. Res. Publ. 2945.
12. Meehan, A. P. 1984. *Rats and Mice: Their Biology and Control*. E. Grinstead, U.K.: Rentokil Ltd.
13. Salmon, T. P., D. A. Whisson, and R. E. Marsh. 2006. [*Wildlife Pest Control around Gardens and Homes*](http://anrcatalog.ucdavis.edu/Details.aspx?itemNo=21385)*, 2nd ed.* Oakland: Univ. Calif. Agric. Nat. Res. Publ. 21385.
14. Timm, R. M. 1994. House Mice.InS. E. Hygnstrom, R. M. Timm, and G. E. Larson, eds. *Prevention and Control of Wildlife Damage*. *Vol. 1.*Lincoln: Univ. Neb. Coop. Ext. pp. B31–B46.
15. Timm, R. M., T. P. Salmon, and R. E. Marsh. Sept. 2011. *Pest Notes:*[*Rats*](http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74106.html). Oakland: Univ. Calif. Agric. Nat. Res. Publ. 74106.
16. *Meerburg BG, Singleton GR, Leirs H (2009).*[*"The Year of the Rat ends: time to fight hunger!"*](http://www3.interscience.wiley.com/journal/121686000/abstract)*. Pest Manag Sci****65****(4): 351–2.*[*doi*](https://en.wikipedia.org/wiki/Digital_object_identifier)*:*[*10.1002/ps.1718*](https://dx.doi.org/10.1002/ps.1718)*.*[*PMID*](https://en.wikipedia.org/wiki/PubMed_Identifier)[*19206089*](https://www.ncbi.nlm.nih.gov/pubmed/19206089)*.*
17. *Meerburg BG, Singleton GR, Kijlstra A (2009).*[*"Rodent-borne diseases and their risks for public health"*](http://www.informahealthcare.com/doi/pdf/10.1080/10408410902989837)*. Crit Rev Microbiol****35****(3): 221–70.*[*doi*](https://en.wikipedia.org/wiki/Digital_object_identifier)*:*[*10.1080/10408410902989837*](https://dx.doi.org/10.1080/10408410902989837)*.*[*PMID*](https://en.wikipedia.org/wiki/PubMed_Identifier)[*19548807*](https://www.ncbi.nlm.nih.gov/pubmed/19548807)
18. [Behney - Explorations of Deer-Mouse](http://www.jstor.org/pss/1374418)
19. [Mouse: Northwestern University Ecodome Information Page](http://www.qrg.northwestern.edu/projects/MarsSim/SimHTML/organisms/mouse.html)
20. *Tembo, Mwizenge S.*[*"Mice as a Delicacy: the Significance of Mice in the Diet of the Tumbuka People of Eastern Zambia"*](http://web.archive.org/web/20080623091951/http%3A/www.bridgewater.edu/~mtembo/mbeba.html)*. Archived from*[*the original*](http://www.bridgewater.edu/~mtembo/mbeba.html)*on 2008-06-23. Retrieved 2008-08-13.*
21. [Food - Frozen mice & rats](http://www.reptilesinc.com.au/shopshow.toy?animalnid=733911&categorynid=25726), Canberra Exotic Pets / reptilesinc.com.au, accessed 2009-11-14
22. Brayton, C. Spontaneous Diseases in Commonly Used Mouse Strains in The Mouse in Biomedical Research, Fox, J.G., Barthold, S.W., et al, Eds. 2006. Elsevier (Academic Press): New York. pp. 623-71
23. Brayton, C.F., Treuting, P.M., and Ward, J.M. Pathobiology of Aging Mice and GEM: Background Strains and Experimental Design. Veterinary pathology. 2012. 49(1):85-105.
24. Percy, D.H. and Barthold, S.W. Pathology of Laboratory Rodents and Rabbits. 3rd ed. 2007: Wiley-Blackwell
25. Frith, C.H. and Ward, J.M. A Color Atlas of Neoplastic and Non Neoplastic Lesions in Aging Miceed. 1988. Elsevier (Print on demand available through the Charles Louis Davis Foundation at http://www.cldavis.org/. Electronic version available online at <http://www.informatics.jax.org/frithbook/>).
26. Danneman, P., Suckow, M., and Brayton, C. THE LABORATORY MOUSE. 2nd ed. 2012. Boca Raton, FL: Taylor and Francis, CRC Press.

1. Hedrich, H.J. Ed. THE LABORATORY MOUSE. 1st ed. Handbook of Experimental Animals, Ed. Bullock, G. and Petrusz, P. 2004. Elsevier Academic Press: London, UK; San Diego, US.
2. Hedrich, H.J. Ed. THE LABORATORY MOUSE. 2nd ed., Ed. Hedrich, H.J. 2012. Academic Press, Elsevier: London, UK.
3. Maronpot, R.R., Boorman, G.A., and Gaul, B.W. Eds. Pathology of the Mouse: Reference and Atlas. 1999. Cache River Press: Vienna, IL
4. Ward, J.M., et al. Pathology of Mice commonly used in Genetic Engineering (C57BL/6; 129; B6;129; FVB), in Pathology of Genetically Engineered Mice, Ward, J.M., Mahler, J.F., et al, Eds. 2000. Iowa State University Press (Blackwell Publishing): Ames, IA. pp. 161-179

**Brief Bio-data of the Student (Biography)**

Rana Chowdhury is a student of the degree of Doctor of Veterinary Medicine (DVM) under the Faculty of Veterinary Medicine, Chittagong Veterinary and Animal Sciences University (CVASU). I passed the Secondary School Certificate Examination (SSC) in 2006 from Abdus Sobahan Rahat Ali High School, Patiya, Chittagong and then Higher Secondary Certificate Examination (HSC) in 2006 from Patiya Govt. College, Chittagong. I admitted at CVASU in 2010. I have a great interest in Wild Animal Research.