

# TAXONOMY OF CLASS AVES AND CLASS MAMMALIA



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in partial fulfilment of requirement for the degree of Bachelor of  
Science in Zoology

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## **CERTIFICATE**

This is to certify that the project work entitled “**A TAXONOMIC STUDY ON THE CLASS AVES AND CLASS MAMMALIA USING THE MUSEUM SPECIMENS**” is an authentic record of the project work submitted by MEECHAL JAMES (Reg. AB20ZOO020) during the academic year 2022-2023 under my supervision and guidance and partial fulfilment of the requirement of the degree Bachelors of science in Zoology, St. Teresa's college (Autonomous), Ernakulam affiliated to Mahatma Gandhi University, Kottayam.

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Examiners

1)

2)

## **DECLARATION**

I hereby declare that the project work entitled “**A TAXONOMIC STUDY ON THE CLASS AVES AND CLASS MAMMALIA USING THE MUSEUM SPECIMENS**” submitted to St. TERESA’S COLLEGE, ERNAKULAM submitted to St. Teresa’s College (Autonomous), Ernakulam affiliated to Mahatma Gandhi University, Kottayam in the partial fulfillment of the requirements of a Bachelor of Science Degree in Zoology, is a record of the original project done by me under the guidance and supervision of Dr. Soja Louis, Assistant Professor of Department of Zoology, St. Teresa’s College (Autonomous), Ernakulam.

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Signature

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## **SYNOPSIS**

The project entitled '**A TAXONOMIC STUDY ON THE CLASS AVES AND CLASS MAMMALIA USING THE MUSEUM SPECIMENS**' was done in order to classify all specimens kept in museum to species level. A vast majority of earth species are still unknown and a tremendous amount of biodiversity is yet to be discovered. Taxonomy aims at classifying organisms into different taxa on the basis of similarities in their phenotypic characteristics that is, the characteristics which are expressed in an organism and that can be examined visually. Since, most of the conserved areas prevent the entry of public people, the only way of studying the characteristic feature of species is by examining the available specimens in the museum. Hence, this project is relevant for this study. In this project, Aves and mammals specimens were examined from the museum and identified to species level, based on their morphological features, distribution. 11 species were grouped into Aves and 8 species were grouped into Mammals.

## **INTRODUCTION**

Taxonomy is the science of naming, describing classifying organisms including plants, animals and microorganism, using morphological, behavioural, genetical and biochemical observation. The present study focuses on the study of taxonomy of class Aves and class Mammalia. **Aves** is a taxonomic class of birds. The class belongs to the phylum Chordata (chordates).It has about 9,000 species. Aves are adapted to fly. They show courtship, parental care, nest building, and territorial behaviour. All modern birds lie within the crown group Aves (alternately Neornithes), which has two subdivisions: the Palaeognathae, which includes the flightless ratites (such as the ostriches) and the weak-flying tinamous, and the extremely diverse Neognathae, containing all other birds.

A **mammal** is a vertebrate animal of the class **Mammalia**. Mammals are characterized by the presence of milk-producing mammary glands for feeding their young, a neocortex region of the brain, fur or hair, and three middle ear bones. Mammals are warm-blooded animals who give birth to their younger ones. They are the most dominant form of animals found in almost all types of habitats. There are about 5,000 species of mammals. Scientists have organized mammals into about 26 orders based on characteristics and structure. There are three subclasses of mammals: Prototheria, Metatheria and Eutheria.

## **REVIEW OF LITERATURE**

### **AVES**

The fossil record and recent molecular phylogenetic studies that address the tempo of diversification typically yield a pattern of early, rapid cladogenesis followed by a decline in diversification rate (Stanley 1973; Harmon et al. 2003; Kadereit et al. 2004; Ruber and Zardoya 2005; Kozak et al. 2006; McKeena and Farrell 2006; McPeck 2008; Phillimore and Price 2008; Gavrilets and Losos 2009).

Tegelstrom. H. And Rytman. H. 1981. Chromosomes in birds (Aves): evolutionary implications of macro- and microchromosome numbers and lengths. The karyotypes of 234 bird species from published reports were analysed with respect to diploid number of chromosomes, number of macro- and microchromosomes, length of microchromosomes compared to macrochromosomes, and centromeric position.

The prevalence and frequency distribution patterns of 10 phthirapteran species infesting house sparrows, Indian parakeets, common mynas, and white breasted kingfishers were recorded in the district of Rampur, India, during 2004–05. The sample mean abundances, mean intensities, range of infestations, variance to mean ratios, values of the exponent of the negative binomial distribution, and the indices of discrepancy were also computed. A Mardiastuti et al., 2021. The research objective was to reveal the bird species that visited *Ficus benjamina* in the low and high urbanization gradients in the tropics. Total of 29 bird species visited *F. benjamina* trees (26 species in low urbanization, 12 species in high),



mainly insectivores, nectarivores, and frugivores birds. Nine species were common in both sites, ie, Spotted Dove, Plaintive Cuckoo, Fulvous-breasted Woodpecker, Small Minivet, Common Iora, Sooty-headed Bulbul, Yellow-vented Bulbul, Common Tailorbird, Scarlet-headed Flowerpecker, and Olive-backed Sunbirds. Nocturnal birds (Collared Scops Owl, Large-tailed Nightjar) were present in low urbanization, but absent in high urbanization site, so did kingfishers (White-throated Kingfisher, Collared Kingfisher) and some other urbanization-prone species.

Rasool et al., 2009 in the study presents concentrations of mercury in tissues (feather, kidney, liver, and muscle) of three kingfisher species from Shadegan Marshes located in the Khuzestan province in the lowlands of southwestern Iran at the head of the Persian Gulf. Jessica et al., 2013 studied the conspicuous, multicomponent ornamentation in male animals can be favored by female mate choice but we know little about the cognitive processes females use to evaluate these traits. Sexual selection may favor attention mechanisms allowing the choosing females to selectively and efficiently acquire relevant information from complex male display traits and, in turn, may favor male display traits that effectively capture and hold female attention. Using a miniaturized telemetric gaze-tracker, we show that peahens (*Pavo cristatus*) selectively attend to specific components of peacock courtship displays and virtually ignore other, highly conspicuous components.

Bradbury and Balsby, 2016 revealed that both sexes of most parrots learn new vocalizations throughout life and produce them in diverse social contexts, whereas few songbird species combine all these traits. recent neurobiological studies have shown that parrots have dual cortical pathway nuclei for vocal learning, only one of which is present in songbirds.

Lauren, 1989 with regard to laterality in animals, the parrot (Psittaciformes) is often overlooked as an example, possibly because it represents a unique exemplar of laterality of limb functions comparable in type and strength to that of man. This conclusion is based on only two reports (Friedman & Davis, 1983; Rogers, 1980) that most parrots are left-handed, i.e. they perch preferentially on the right leg but stand with the left. In fact, speculations and scientific studies on the laterality of parrots go far beyond these two studies.

Fister et al., 2014. This chapter summarizes briefly the majority of the literature about cuckoo search in peer-reviewed journals and conferences found so far. These references can be systematically classified into appropriate categories, which can be used as a basis for further research. Miranda et al., 2011 constructed a phylogenetic hypothesis of the pattern of colonization of Philippine scops owls (*Otus* and *Mimizuku*). Two mitochondrial genes, ND2 and cytochrome b, were sequenced for 12 samples representing six Philippine endemic taxa: three endemic species, one of which has three endemic subspecies; and one endemic genus. Topology, branch length information, and sequence divergence were used to present the hypothesis for the pattern, direction, and sequence of island colonization events

Mori et al., 2017 studied the potential for nest site competition between ring-necked parakeets and the native scops owl *Otus scops*, a small nocturnal migratory raptor, by comparing the spatial distribution of the nest site locations of the raptor before (2002) and after (2015) the parakeet invasion.

Gaston, 1977 studied the five aspects of intra-group behaviour among wild jungle babblers were analysed in relation to the age, sex and breeding status of the participants. The amount of participation in allopreening, sentinel behaviour, and movement initiation were found to be closely correlated with age and breeding

status, resulting in a rough concordance between rankings based on these three activities.

## **MAMMALIA**

Shane et al., 1986 in this report the authors review the literature on bottlenose dolphin ecology, behaviour and social organization, focusing on data collected on free-ranging animals. Most bottlenose dolphins studied to date have had definable home ranges, and behavioural, morphological and biochemical information indicates discrete stocks in some areas.

Eshar and Beaufrere, 2020 tested protocols in this study provided safe and effective immobilization in five striped palm squirrels, but oxygen and thermal support were indicated. Anesthetic depth must be determined before surgical procedures are performed in palm squirrels anesthetized by using these regimens.

Fowler, 1987 reported that population regulation has been central to much of the work on the population biology of both animals and plants, as seen in much of the literature. Recent developments in the theoretical aspects of population dynamics have led to a growing union of the concepts of life history analysis with those of population regulation, both in an evolutionary context.

Gini, 1951 said that a much wider and more thorough research was made by Geissler, who in 1889 published data on the combinations of the sexes in the families, as they were given by the parents at the birth of each child, in the kingdom of Saxony from 1876 to 1885.

Hollen and Radford, 2009 in his publication titled Alarm calling is a widespread antipredator behaviour. Although the function and evolution of alarm call

behaviour have long been studied in detail, only in the last decade has there been an upsurge in research into its development. We detail the mechanistic processes that may underlie the development of each aspect, consider the selection pressures most likely to explain the relative importance of these processes, and discuss the substantial variation in developmental rates found both between and within species.

Young, 1994 The viability of populations is a central concern of biological conservation. The occurrence of catastrophic die-offs may greatly reduce the long-term viability of populations. Theoretical extinction models and viability analyses require information on the frequency of die-offs and on the distribution of die-off severities. A review of literature identified 96 natural die-offs in large mammal populations, with a die-off being defined as a peak-to-trough decline in estimated population numbers of at least 25%.

Briefer, 2012 said that emotions play a crucial role in an animal's life because they facilitate responses to external or internal events of significance for the organism. In social species, one of the main functions of emotional expression is to regulate social interactions. There has recently been a surge of interest in animal emotions in several disciplines, ranging from neuroscience to evolutionary zoology. Because measurements of subjective emotional experiences are not possible in animals, researchers use neurophysiological, behavioural and cognitive indicators.

Chew, 1978 in his article was concerned with the evaluation of the effects of small mammals on the characteristics of ecosystems, as a matter of basic scientific importance, and of necessity in a humanly managed biosphere. The review emphasizes literature in which there is experimental demonstration of effects of

small mammals, strong circumstantial evidence for an effect, and indication of a possible effect in an unstudied relationship.

Elangovan et al., 2000 Nectar feeding behavior of the short-nosed bat, *Cynopterus sphinx*, was observed under natural conditions in South India. Nectar production of 'steady-state' flowers of *Mussaenda parviflora* and 'big-bang' flowers of *Bassia latifolia* was quantified.

Dong et al., 2013 reported bats have aroused great interests of researchers for the sake of their advanced echolocation system. However, this highly specialized trait is not characteristic of Old World fruit bats. To comprehensively explore the underlying molecular basis between echolocating and non-echolocating bats, we employed a sequence-based approach to compare the inner ear expression difference between the Rickett's big-footed bat (*Myotis ricketti*, echolocating bat) and the Greater short-nosed fruit bat (*Cynopterus sphinx*, non-echolocating bat). The results showed that the biological implications of up-regulated genes in *M. ricketti* were significantly over-represented in biological process categories such as 'cochlea morphogenesis', 'inner ear morphogenesis' and 'sensory perception of sound', which are consistent with the inner ear morphological and physiological differentiation between the two bat species.

Jayaraj et al., 2012 showed a predictive model to differentiate the fruit bats *Cynopterus brachyotis* and *C. cf. brachyotis* Forest (Chiroptera: Pteropodidae) from Malaysia using multivariate analysis. In this study, they attempted to develop prediction models to identify both *C. brachyotis* and *C. cf. brachyotis* Forest in this region based on multivariate statistics.

Storz., 2000 found that there is considerable uncertainty surrounding the taxonomic relationship between *Cynopterus sphinx* and *C. brachyotis*, and the status of the many named forms within *C. sphinx* (Storz & Kunz 1999). Polymorphic microsatellite markers for cynopterine fruit bats would greatly aid efforts to elucidate species boundaries and genetic correlates of morphological variation within species. To assess levels of variation in *C. sphinx* and *C. brachyotis*, microsatellite genotypes were obtained for a total of 731 bats (620 *C. sphinx* and 111 *C. brachyotis*)

## **METHODOLOGY**

### **MATERIALS REQUIRED:**

Formalin, Bucket, Water, Scale, Thread, Bottle for dry and wet specimens.

### **METHOD:**

Specimens kept in the museum classified under the class Aves and class Mammalia were observed. First of all specimens were taken out of the museum. Then their external features were observed and scientific measurements were made. The dry specimens were dipped to bleach solution made with 3 spoons of bleach water. For certain hours and were rubbed with a brush for further cleaning and old formalin solution of wet specimens were removed and fresh formalin solution were added in the ratio 9:1 after cleaning the specimen bottles with detergents. The specimens were then put back into the bottle. Finally labels were tagged on each specimen bottles which contain information on their kingdom, phylum, class, order, family, genus and species.

## **OBSERVATIONS AND RESULT**

<b>AVES</b>	<b>MAMMALIA</b>
<i>Halcyon</i>	<i>Cynopterus brachyotis</i>
<i>Agarponis</i>	<i>Nycteris grandis</i>
<i>Ottus bakkamoena</i>	<i>Miniopterus schreibersil</i>
<i>Melopsittacus</i>	<i>Lyroderma lyra</i>
<i>Pavo cristatus</i>	<i>Craseoycteris thonglongyal</i>
<i>Amaurornis phoenicurus</i>	<i>Paraechinus micropus</i>
<i>Argya striata</i>	<i>Funambulus palmarum</i>
<i>Psittacula columboides</i>	<i>Platanista gangetica</i>
<i>Cuculus micropterus</i>	
<i>Cuculus canorus</i>	
Ostrich egg	



## **CLASS AVES**

KINGDOM: Animalia

PHYLUM: Annelida

CLASS : Aves

ORDER :Coraciiformes

FAMILY : Alcedinidae

GENUS : Halcyon

### ***DESCRIPTION:***

- This is a large kingfisher, 27–28 cm in length.
- The large bill and legs are bright red.
- Its head, shoulders, flanks and lower belly are chestnut, and the throat and breast are white.

### ***HABITAT:***

Mostly open country in the plains with trees, wires or other perches.

### ***DISTRIBUTION:***

Sundarbans mangroves.



Kingdom:Animalia

Phylum:Chordata

Class:Aves

Order:Psittaciformes

Family:Psittaculidae

Genus: Agapornis

***DESCRIPTION:***

- The face and throat are pink, darkest on the forehead and above the eye.
- The bill is horn-coloured, the iris is brown, and the legs and feet are grey.

***HABITAT:***

- Inhabits dry, open country.
- Broad-leaved woodland, semi-desert, and mountainous areas.

***DISTRIBUTION:***

Southwest Africa.



Kingdom: Animalia

Phylum: Chordata

Class: Aves

Order: Strigiformes

Family: Strigidae

Genus: Otus

Species: Otus bakkamoena

***DESCRIPTION:***

- It has small head tufts, or ears.
- The upperparts are grey or brown, depending on the morph, with faint buff spotting.

***DISTRIBUTION and HABITAT:***

The species occurs from eastern Arabia through the Indian Subcontinent, except the far north.



Kingdom:Animalia

Phylum:Chordata

Class: Aves

Order:Psittaciformes

Family:Psittaculidae

Genus:Melopsittacus

***DESCRIPTION :***

- A light green body colour, while their mantles display pitch-black mantle markings edged in clear yellow undulations.
- The forehead and face is yellow in adults.

***HABITAT:***

Open habitats, primarily in scrublands, open woodlands, and grasslands.

***DISTRIBUTION:***

Australia



Kingdom:Animalia

Phylum:Chordata

Class:Aves

Order:Galliformes

Family:Phasianidae

Genus:Pavo

Species:P. cristatus

***DESCRIPTION :***

- Peahen has a rufous-brown head with a crest, tips are chestnut edged with green.
- The upper body is brownish with pale mottling.

***HABITAT:***

found in moist and dry-deciduous forests.

***DISTRIBUTION :***

Indian subcontinent and inhabits the drier lowland areas of Sri Lanka.



Kingdom:Animalia

Phylum:Chordata

Class:Aves

Order:Gruiformes

Family:Rallidae

Genus:Amaurornis

Species:A. phoenicurus

***DESCRIPTION :***

Dark grey upperparts and flanks, and a white face, neck and breast.

***HABITAT:***

Freshwater marshes and in habitats with dense undergrowth.

***DISTRIBUTION :***

South and Southeast Asia.





Kingdom:Animalia

Phylum:Chordata

Class:Aves

Order:Passeriformes

Family:Leiothrichidae

Genus:Argya

***DESCRIPTION:***

Brownish grey with a yellow-bill.

***HABITAT :***

Habitat is forest and cultivation.

***DISTRIBUTION :***

India, Bangla Desh and northeastern Pakistan.



Kingdom:Animalia

Phylum:Chordata

Class:Aves

Order:Psittaciformes

Family:Psittaculidae

Genus:Psittacula

Species:P. columboides

***DISCRIPTION:***

- Bluish grey with a long yellow-tipped tail.
- The black neck ring is complete in both males and females.

***HABITAT :***

Parakeets occur worldwide in warm regions.

***DISTRIBUTION :***

Western Ghats south.





Kingdom:Animalia

Phylum:Chordata

Class:Aves

Order:Cuculiformes

Family:Cuculidae

Genus:Cuculus

Species:C. micropterus

***DISCRIPTION:***

- Grey upperparts while the underside has broad black barring.
- The tail is barred with a broad subterminal dark band and a white tip.

***HABITAT :***

Habitat is deciduous and evergreen forests.

***DISTRIBUTION :***

Indian subcontinent and Southeast Asia.



Kingdom:Animalia

Phylum:Chordata

Class:Aves

Order:Cuculiformes

Family:Cuculidae

Genus:Cuculus

Species:C. canorus

***DESCRIPTION :***

- A greyish, slender body and long tail.
- The grey throat extends well down the bird's breast with a sharp demarcation to the barred underparts.

***HABITAT:***

Coniferous and deciduous forests and woodlands.

***DISTRIBUTION :***

Europe and Asia, and winters in Africa.



- The egg of the ostrich (genus *Struthio*) is the largest of any living bird.
- The shell has a long history of use by humans as a container and for decorative artwork, including beads.
- The eggs are not commonly eaten.
- The female common ostrich lays her fertilized eggs in a single communal nest, a simple pit, scraped in the ground by the male.
- The dominant female lays her eggs first, and when it is time to cover them for incubation she discards extra eggs from the weaker females, leaving about 20 in most cases.
- They are glossy cream-colored, with thick shells marked by small pits.
- The eggs are incubated by the females by day and by the males by night. This uses the coloration of the two sexes to escape detection of the nest, as the drab female blends in with the sand, while the black male is nearly undetectable in the night.



**CLASS MAMMALIA**

Kingdom:Animalia

Phylum:Chordata

Class:Mammalia

Order:Chiroptera

Family:Pteropodidae

Genus:Cynopterus

Species:C. brachyotis

***DESCRIPTIONS :***

- Brown to yellowish brown with a brighter collar.
- The edges of the ears and the wing bones are usually white.
- A fox-like face and large dark eyes.

***HABITAT :***

Disturbed forest, including lower montane forest and tropical lowland rain forest.

***DISTRIBUTION:***

Sri Lanka, southwest and northeast India.





Kingdom:Animalia

Phylum:Chordata

Class:Mammalia

Order:Chiroptera

Family:Nycteridae

Genus:Nycteris

Species:N. grandis

**DESCRIPTION :**

- A reddish brown to gray fur on the back and upper areas.
- The torso is pale grey.
- The furrow is partially covered by its nose-leaf.

**HABITAT :**

Savannah woodlands and rainforests.

**DISTRIBUTION :**

Eastern, Central, and Western Africa.



Kingdom:Animalia

Phylum:Chordata

Class:Mammalia

Order:Chiroptera

Family:Miniopteridae

Genus:Miniopterus

Species:M. schreibersii

***DESCRIPTION :***

- It has dark brown to reddish brown fur on the back, grey-brown fur on the belly and a distinctive domed forehead.
- A tiny microbat.

***HABITAT :***

Large caves or mines.

***DISTRIBUTION :***

Southern Palearctic, Ethiopic, Oriental, and Australian regions.



Kingdom:Animalia

Phylum:Chordata

Class:Mammalia

Order:Chiroptera

Family:Craseonycteridae

Genus:Craseonycteris

Species:C. thonglongyai

***DESCRIPTION :***

- Upperparts are reddish-brown or grey, while the underside is generally paler.
- A distinctive swollen, pig-like snout[3] with thin, vertical nostrils.

***HABITAT :***

Occupies limestone caves along rivers within dry evergreen or deciduous forests.

***DISTRIBUTION:***

Western Thailand and southeast Myanmar.



Kingdom:Animalia

Phylum:Chordata

Class:Mammalia

Order:Chiroptera

Family:Megadermatidae

Genus:Lyroderma

Species:L. lyra

***DESCRIPTION :***

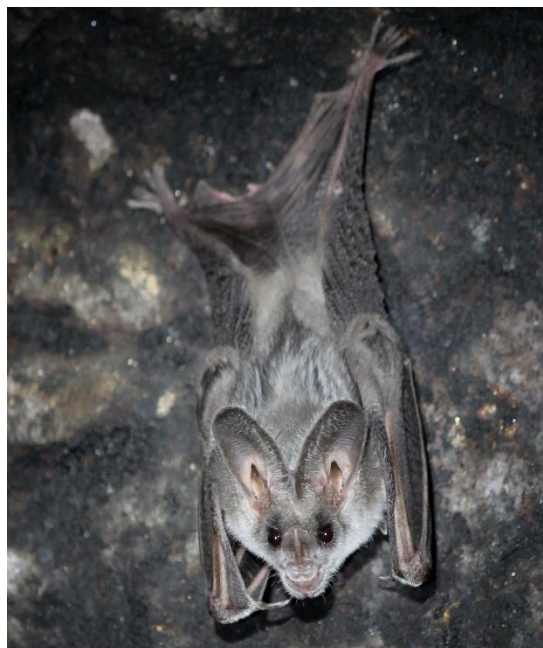
- It has large ears and no tail.
- Its fur is blue-gray in color overall and brownish gray on the underside.

***HABIT :***

Caves and tree hollows.

***DISTRIBUTION :***

South Asia and Southeast Asia. Habitat





Kingdom:Animalia

Phylum:Chordata

Class:Mammalia

Order:Rodentia

Family:Sciuridae

Genus:Funambulus

Species:F. palmarum

***DESCRIPTION :***

- Back is a grizzled, grey-brown colour with three conspicuous white stripes which run from head to tail.
- It has a creamy-white belly and a tail covered with interspersed, long, black and white hair.

***HABITAT :***

Tropical dry forests, rainforests, mangrove forests.

***DISTRIBUTION :***

Indian palm squirrels are found in India and Sri Lanka.



Kingdom:Animalia

Phylum:Chordata

Class:Mammalia

Order:Artiodactyla

Family:Platanistidae

Genus:Platanista

Species:P. gangetica

***DESCRIPTION :***

- Tan, chocolate brown, dark grey or light blue.
- They have an elongated, slender snout with sharp and very pointed teeth, similar to most river dolphins.

***HABITAT :***

Freshwater .

***DISTRIBUTION :***

Ganges-Brahmaputra-Meghna and Karnaphuli-Sangu river systems of Nepal, India, and Bangladesh.



Kingdom:Animalia

Phylum:Chordata

Class:Mammalia

Order:Eulipotyphla

Family:Erinaceidae

Genus:Paraechinus

Species:P. micropus

***DESCRIPTION :***

- Masked face, dark with a white top.
- Brown with a few lighter shades of brown.

***HABITAT :***

Sandy desert areas.

***DISTRIBUTION :***

India and Pakistan.



## **CONCLUSION**

Taxonomic keys are used for the taxonomic identification where they provide the unique characteristics of species with written descriptions and pictures. They are also capable of conveying natural variation in the morphology of species nor the small yet characteristic morphological features of a species. Taxonomic identification is less time consuming and as they help students by providing necessary information on the specimens with referring any internet or book sources. Eventhough many species of Aves and Mammalia observed in the museum were originally distributed all over the India. So, these may have become invasive ( A species is regarded as invasive if it has become introduced to a location, area or region where it did not previously occur naturally and becomes capable of establishing a breeding population in the new location).

## **DISCUSSION**

**Birds** are a group of warm-blooded vertebrates constituting the **class Aves**, characterised by feathers, toothless beaked jaws, the laying of hard-shelled eggs, a high metabolic rate, a four-chambered heart, and a strong yet lightweight skeleton. The first classification of birds was developed by Francis Willughby and John Ray in their 1676 volume *Ornithologiae*. Carl Linnaeus modified that work in 1758 to devise the taxonomic classification system currently in use. Birds are categorised as the biological class Aves in Linnaean taxonomy. Phylogenetic taxonomy places Aves in the clade Theropoda.

The research paper “A Phylogenetic classification of the recent birds of world” discuss mainly about the avian classifications should express the content of natural groups, that is, taxa that are our best estimates of genealogically related groups of species. s. The information content of classifications consists only of the hierarchical arrangement of groups within groups, and phylogenetic classifications can store and retrieve such information precisely because genealogical relationships are hierarchical in their logical structure. One obvious goal of avian classifications is to express as much information about group membership as possible. Thus, a major effort should be expended to resolve the hierarchical structure of avian taxa and to express that in classifications. Classifications without much structure are simply uninformative and of little scientific merit.

A **mammal** is a vertebrate animal of the class Mammalia. Mammals are characterized by the presence of milk-producing mammary glands for feeding

their young, a neocortex region of the brain, fur or hair, and three middle ear bones. Most mammals are intelligent, with some possessing large brains, self-awareness, and tool use.

A research paper “Immunology of placentation in eutherian mammals “The anatomical relationship between the placenta and the uterus of eutherian mammals.

The anatomical relationship between the placenta and the uterus holds the key to our understanding of the 'immunological paradox' of pregnancy because this is where direct tissue contact occurs. There is great diversity in placental structures in eutherian mammals. For immunologists, the most important feature is the extent to which the placental trophoblast cells invade the uterus. This ranges from no invasion at all (epitheliochorial placentation) to very extensive invasion (haemochorial placentation). The human placenta is the most invasive of all. During pregnancy, in invasive forms of placentation, the uterine lining is transformed into decidual tissue. The most obvious feature of the decidua is the influx of a distinctive population of uterine natural killer (NK) cells. Trophoblast cells express an array of MHC molecules some of which might be potential ligands for receptors expressed by the NK cells and expressed by myelomonocytic cells in the uterus.

Interaction between HLA-C expressed by trophoblast cells and KIRs on maternal NK cells influences reproductive performance. Binding of HLA-G to LILRB molecules might induce tolerance in maternal T cells, thereby allowing cooperation between the innate and adaptive immune systems in mammalian reproduction.

It is proposed that the function of uterine NK cells is to alter the structure of the uterine spiral arteries that supply the feto-placental unit. This effect could be mediated directly by affecting the structure or function of the vessel wall (as in mice) or indirectly through the influence on trophoblast-cell infiltration. The arterial modification is necessary to allow sufficient blood flow to the placenta and fetus. Inadequate arterial transformation results in pregnancy disorders (such as fetal growth restriction or pre-eclampsia).

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