World Birds Atlas

Volume (1)

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ماجستير في علم الأحياء- مجاز في الباثولوجيا السريرية

أخصائي في التشخيص المخبري

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Birds

Birds are warm-blooded, bipedal animals whose anatomy is characterized by wings, whose exterior is covered by feathers, and that have, in most cases, hollow bones to assist in flight**.** Birds are a diverse group, and their bright colors, distinct songs and calls add enjoyment to our lives. They are very visible, quite common, and offer easy opportunities to observe their diverse plumage and behaviors. Because of this, birds are popular to many who pursue wildlife watching and monitoring activities. Being warm-blooded and egg-laying, having feathers and wings, birds are the most speciose class of tetrapod vertebrates. With around 10,000 living species, they inhabit ecosystems across the globe, from the Arctic to the Antarctic. They range in size from the 5 cm (Hummingbird) to the 2.75 m (Ostrich) [(1)] . The majority of wildlife observations reported by volunteers are birds. In fact, bird watching is the fastest growing recreational pursuit in the United States. America as a nation spend over 2 billion dollars on commercial bird food! Adding all wildlife watching equipment together, including bird food, binoculars, spotting scopes, film, etc., the nation spends nearly 20 billion dollars! [(2)]

Shared characteristics of birds may include a bony or hard beak with no teeth, the laying of hard-shelled eggs, a light but strong skeleton, a high rate of metabolism and a four-chambered heart . All living species of birds have wings; and most bird species can fly. Flightless birds include ratites, Penguins, and a number of diverse island species. Birds have unique digestive and respiratory systems that are highly suitable for flight. Birds are social; they communicate using

visual signals and through calls and songs, and participate in social behaviors, including cooperative breeding and hunting, flocking, and mobbing of predators. A number of bird species have been observed manufacturing and using tools, and many social species exhibit cultural transmission of knowledge across generations. Corvids and parrots, are considered among the most intelligent animal species[1].

About 120–130 species have become extinct as a result of human activity since the 17th century, and hundreds more before then. Though efforts are underway to protect them, about 1,200 species of birds currently are threatened with extinction by human activities.

The vast majority of bird species are socially monogamous, usually for one breeding season at a time, sometimes for years, but rarely for life. Other species have polygynous (many females) breeding systems. Eggs are usually laid in a nest and incubated by the parents. Most birds have an extended period of parental care after hatching. Many species undertake long distance annual migrations, and many more perform shorter irregular movements.

Birds figure prominently in all aspects of human culture from poetry to popular music. Many species are of economic importance, mostly as sources of food acquired through hunting or farming. The most commonly eaten species is the domestic chicken, although geese, pheasants, turkeys and ducks are also common fare, particularly around Thanksgiving Day and the holidays. Birds grown for human consumption are known as poultry Some species, particularly songbirds and parrots, are popular as pets. Other uses include the harvesting of droppings for use as a fertilizer[2] .

Birds live and breed in most terrestrial habitats and on all seven continents, reaching their southern extreme breeding colonies up to 440 kilometers inland in Antarctica. The highest bird diversity occurs in tropical regions. Several families of birds are able to live in both on the world's oceans and in them, with some seabird species coming ashore only to breed and some penguins have been recorded diving up to 300 meters.[1]

Birds feed on plants, seeds, insects, fish, carrion or other birds. Birds are critical links within the vast food chains and webs that exist in the ecosystem. Birds occupy a wide range of ecological positions. While some birds are generalists, others are highly specialized in their habitat or food requirements. Even within a single habitat, such as a forest, the niches occupied by different species of birds vary, with some species feeding in the forest canopy, others beneath the canopy, and still others on the forest floor. Other species of birds have come to depend on human activities for food and are so widespread as to be considered a nuisance such as the common pigeon or rock pigeon. Some birds transport a variety of things through the environment. For example, birds serve to spread seeds of various plants, thereby helping in plant dispersal. American robins feeding on mulberries eventually deposit the seeds to other locations in there droppings.

Forest birds may be insectivores, frugivores, and nectarivores. Aquatic birds generally feed by fishing, plant eating, and piracy or kleptoparasitism. Some nectar-feeding birds are important pollinators, and many frugivores play a key role in seed dispersal.[2] In some cases a flower's primary pollinator is the only species capable of

reaching its nectar. If you've ever spent time on a summer evening looking up at the sky, you've undoubtedly seen swallows, swifts, and nighthawks swooping and gliding through the air. These aerial acrobats are consuming hundreds of insects, many of which we consider pests. Birds of prey specialize in hunting mammals or other birds[(2)].

Many bird species have established breeding populations in areas to which they have been introduced by humans. Some of these introductions have been deliberate; the Ring-necked Pheasant, for example, has been introduced around the world as a game bird. Others have been accidental, such as the establishment of wild Monk Parakeets in several North American cities after their escape from captivity. Some species, including Cattle Egret, Yellow-headed Caracara and Galah, have spread naturally far beyond their original ranges as agricultural practices created suitable new habitat. Some birds have been used by humans to perform tasks, such as homing pigeons, and falcons to aid in hunting or for sport. Most birds are diurnal, but some birds, such as owls and nightjars, are active during twilight hours, and many coastal waders feed when the tides are appropriate, by day or night.[(3)]

The bird population, like many other fish and wildlife groups, is facing threats worldwide. Bird populations are declining, with 1,200 species facing extinction in the next century. Among the most prevalent reasons cited are habitat loss, predation by nonnative species, oil spills and pesticide use, climate change and excessive rates of hunting and fishing. All these threats make it ever more important to understand, appreciate and protect the birds we see around us everyday.

Physiology and anatomy:

A knowledge of the anatomy and physiology of an animal is essential for understanding. Birds have one of the most complex respiratory systems of all animal groups.[3] The avian respiratory system is different from that of other vertebrates, with birds having relatively small lungs plus air sacs that play an important role in respiration. Upon inhalation, 75% of the fresh air bypasses the lungs and flows directly into a posterior air sac_which extends from the lungs and connects with air spaces in the bones and fills them with air. The other 25% of the air goes directly into the lungs. When the bird exhales, the used air flows out of the lung and the stored fresh air from the posterior air sac is simultaneously forced into the lungs. Thus, a bird's lungs receive a constant supply of fresh air during both inhalation and exhalation.[4] Therefore, in bird lungs, more oxygen is available to diffuse into the blood. Sound production is achieved using the syrinx, a muscular chamber incorporating multiple tympanic membranes which diverges from the lower end of the trachea; the trachea being elongated in some species, increasing the volume of vocalizations and the perception of the bird's size.[1] Birds depend heavily on their digestive systems to remain nourished and healthy. Digestion in birds involves a lot of organs, each performing a specific function. It begins with entry of food via the beak and ends with waste exiting at the vent. Many birds can starve in hours if deprived of food, therefore, their digestive system is faster and more efficient than those of other vertebrate groups. Food is broken down and absorbed for use along the way[5]. The bird's heart has four chambers like a mammalian heart. In birds the main arteries taking blood away from the heart originate from the right aortic arch (or

pharyngeal arch), unlike in the mammals where the left aortic arch forms this part of the aorta. The postcava receives blood from the limbs via the renal portal system. Unlike in mammals, the circulating red blood cells in birds retain their nucleus.(1)

Like the reptiles, birds are primarily uricotelic, that is, their kidneys extract nitrogenous wastes from their bloodstream and excrete it as uric acid instead of urea or ammonia via the ureters into the intestine. Birds do not have a urinary bladder or external urethral opening and (with exception of the Ostrich) uric acid is excreted along with feces as a semisolid waste. However, birds such as hummingbirds can be facultatively ammonotelic, excreting most of the nitrogenous wastes as ammonia. They also excrete creatine, rather than creatinine like mammals.[3] This material, as well as the output of the intestines, emerges from the bird's cloaca. The small intestine is where food is digested and absorbed. The small intestine varies in length and structure depending on the diet of the species. Carnivorous birds tend to have shorter, less complex small intestines. Herbivorous birds have longer, more developed small intestines. Nutrients are absorbed through the intestinal membranes and into the bloodstream. The avian large intestine is reduced to a short, featureless connection between the small intestine and the cloaca. The cloaca is a multi-purpose opening: waste is expelled through it, most birds mate by joining cloaca, and females lay eggs from it. In addition, many species of birds regurgitate pellets.(5) Males within Palaeognathae, the Anseriformes, and in rudimentary forms in Gallifrormes possess a penis, which is never present in Neoaves. When not copulating, it is hidden within the proctodeum compartment within the cloaca, just inside the vent. The digestive system of birds is

unique, with a crop for storage and a gizzard that contains swallowed stones for grinding food to compensate for the lack of teeth. Most birds perform rapid digestion to aid with flight. Enzymes, produced in the pancreas, break down proteins and fats in the small intestine. Some migratory birds are capable to use protein from many parts of their bodies, including protein from the intestines, as additional energy during migration.(5)

The nervous system is large relative to the bird's size. Cerebellum coordinates movement. The most developed part of the brain is the one that controls the flight-related functions. The cerebrum controls behavior patterns, navigation, mating and nest building. Most birds have a poor sense of smell with notable exceptions including kiwis, New World vultures and tubenoses. The avian visual system is usually highly developed. Water birds have special flexible lenses, allowing accommodation for vision in air and water. Some species also have dual fovea. Some birds whose sexes appear similar to the naked eye are distinguished by the presence of ultraviolet reflective patches on their feathers. Many birds show plumage patterns in ultraviolet that are invisible to the human eye. Birds are tetrachromatic, possessing ultraviolet (UV) sensitive cone cells in the eye as well as green, red and blue ones. This allows them to perceive ultraviolet light, which is involved in courtship. Male Blue Tits have an ultraviolet reflective crown patch which is displayed in courtship by posturing and raising of their nape feathers.[30] Ultraviolet light is also used in foraging—kestrels have been shown to search for prey by detecting the UV reflective urine trail marks left on the ground by rodents. The bird retina has a fan shaped blood supply system called the pecten. The eyelids of a bird are not used in blinking. Instead the

eye is lubricated by the nictitating membrane, a third eyelid that moves horizontally. The nictitating membrane also covers the eye and acts as a contact lens in many aquatic birds. Most birds cannot move their eyes, although there are exceptions, such as the Great Cormorant. Birds with eyes on the sides of their heads have a wide visual field, while birds with eyes on the front of their heads, such as owls, have binocular vision and can estimate the depth of field.[34] The avian ear lacks external pinnae but is covered by feathers. The inner ear has a cochlea, but it is not spiral as in mammals.[1]

A few species are able to use chemical defenses against predators; some Procellariiformes can eject an unpleasant oil against an aggressor, and some species of pitohuis from New Guinea have a powerful neurotoxin in their skin and feathers.

The skeleton consists of very lightweight with mostly thin and hollow bones. They have large air-filled cavities connect with the respiratory system. The skull bones in adults are fused and do not show cranial sutures. The keel-shaped sternum is where the powerful flight muscles attach to the body. The orbits are large and separated by a bony septum. The spine has cervical, thoracic, lumbar and caudal regions with most birds having 13 to 25 of very flexible neck vertebrae. The number of cervical (neck) vertebrae is highly variable and especially flexible, but movement is reduced in the anterior thoracic vertebrae and absent in the later vertebrae. The last few are fused with the pelvis to form the synsacrum, making the skeleton more rigid. The ribs are flattened and the forelimbs are modified into wings.[6]

Birds have two sexes: male and female. Male birds have two Z chromosomes (ZZ), and female birds have a W chromosome and a Z chromosome (WZ). The sex of birds is determined by the Z and W sex chromosomes, rather than by the X and Y chromosomes present in mammals. In nearly all species of birds, an individual's sex is determined at fertilization. However, one recent study demonstrated temperature-dependent sex determination among Australian Brush-turkeys, for which higher temperatures during incubation resulted in a higher female-to-male sex ratio.[1]

Feathers, plumage, and scales:

Birds have a wide range of body designs. Feathers are epidermal growths attached to the skin and arise only in specific tracts of skin called pterylae. They are composed of B-keratin[7]. They represent a feature characteristic of birds. They facilitate flight, provide insulation that aids in thermoregulation, and are used in display, camouflage, and signaling.[3] Feathers are incredibly strong and yet are incredibly flexible. To allow both lift and forward movement, feathers can bend at almost a right angles. The arrangement and appearance of feathers on the body, called plumage, may vary within species by age, social status, and sex. Scales and feathers develop in a similar fashion. Birds have both feathers and scales. Scales are found on the legs and feet of most birds. The distribution pattern of the feather tracts (pterylosis) is used in taxonomy and systematics.

Molting is annual in most species, although some may have two molts a year. It is when the bird drops old feathers and grows in new ones. A small number of species, such as ducks and geese, lose all

of their flight feathers at once, temporarily becoming flightless.[7] Eagles and large vultures take two to three years to complete a molt. As a general rule, the tail feathers are molted and replaced starting with the innermost pair. Centripetal molts of tail feathers are however seen in the Phasianidae. In order to maintain a functional climbing tail the centripetal molt is modified in the tail feathers of some birds, it begins with the second innermost pair of feathers and finishes with the central pair. The general pattern seen in passerines is that the tail is replaced from center outward. Feathers require maintenance and birds use their beaks to preen or clean and arrange their feathers daily, spending an average of around 9% of their daily time on this. Applying waxy secretions through the bill from the uropygial gland; these secretions protect the feathers' flexibility, inhibiting the growth of feather-degrading bacteria and act as an antimicrobial agent,. This may be supplemented with a behavior known as anting, in which the bird encourages ants to run through their plumage, and by secretions of formic acid from ants, this will remove feather parasites.[1]

Before nesting, the females of most bird species gain a bare brood patch by losing feathers close to the belly. The skin there is well supplied with blood vessels and helps the bird in incubation.

Feathers being critical to the survival of a bird, they face the onslaught of fungi, ectoparasitic and feather mites. Birds bathe in water or dust themselves. Some vultures will even fly up to 32 kilometers to find water to bathe in after feeding. Birds of arid regions make use of loose soil to dust-bathe. While some birds dip into shallow water, more arboreal species often make use of dew or rain that collect on leaves. To reduce fungal and ectoparasitic activity that

may lead to feather damage many species will spread out their wings and expose them to direct sunlight.

The scales of birds are composed of the same keratin as beaks, claws, and spurs. They are found mainly on the toes and metatarsus, but may be found further up on the ankle in some birds. The scales of birds are thought to be equivalent to those of reptiles and mammals.[1]

Flight:

There are almost as many ways of flying as there are kinds of birds[8]. The capability of Birds for flight is achieved by their lightweight skeleton, two large flight muscles, the pectoralis and the supracoracoideus, as well as a wing that serves as an aerofoil. Bird wings are not the only part of their bodies designed for flight. Wing shape and size generally determine a bird species' type of flight. Flight is the primary means of locomotion for most bird species and is used for breeding, feeding, and predator avoidance and escape. Most birds can fly, which distinguishes them from almost all other vertebrate classes. Birds have many different ways of taking off. Some, like loons, run into the wind, and the rush of air beneath their wings lifts them up. Others, like puffins and Peregrine Falcons, jump off cliffs and other high perches. About 60 extant bird species are flightless. Though flightless, penguins use similar musculature and movements to dive through the water.[1]

Migration of birds is highly demanding energetically, particularly as birds need to cross deserts and oceans without refueling. Migration optimizes availability of food sources and breeding habitat. Many bird

species migrate to take advantage of global differences of seasonal temperatures. These migrations vary among the different groups. Landbirds have a flight range of around 2,500 km and shorebirds can fly up to 4,000 km, although the Bar-tailed Godwit is capable of non-stop flights of up to 10,200 km. These birds are characterized by a breeding season spent in the temperate or arctic / antarctic regions and a non-breeding season in the tropical regions or opposite hemisphere. Many landbirds, shorebirds, and waterbirds undertake annual long distance migrations, usually triggered by the length of daylight as well as weather conditions. Before migration, birds substantially increase body fats and reserves and reduce the size of some of their organs. The longest annual migration for seabirds being those of Sooty Shearwaters, which nest in New Zealand and Chile and spend the northern summer feeding in the North Pacific off Japan, Alaska and California, an annual round trip of 6,400 km. Other seabirds disperse after breeding, travelling widely but having no set migration route. Albatrosses nesting in the Southern Ocean often undertake circumpolar trips between breeding seasons.

A behavior of some bird species in some regions is the Partial migration, where only a fraction of the population, usually females and subdominant males, migrate apart form a large percentage of the migration. In Australia, surveys found that 44% of non-passerine birds and 32% of passerines were partially migratory. . Some bird species undertake shorter migrations, traveling only as far as is required to avoid bad weather or obtain food. Other species migration is normally associated with food availability. The boreal finches are one such group and can commonly be found at a location in one year and absent the next. This type of Species may also travel shorter

distances over part of their range, with individuals from higher latitudes travelling into the existing range of conspecifics. Altitudinal migration is most often triggered by temperature changes and usually occurs when the normal territories also become inhospitable due to lack of food. It is a form of short distance migration in which birds spend the breeding season at higher altitudes elevations and move to lower ones during suboptimal conditions. Some species may also be nomadic, holding no fixed territory and moving according to weather and food availability. Parrots as a family are overwhelmingly neither migratory nor sedentary but considered to either be dispersive, irruptive, nomadic or undertake small and irregular migrations.

The ability of birds to return to precise locations has been known; in an experiment a Manx Shearwater spent a distance of 5,150 km and returned from Boston to its colony in Skomer, Wales, within 13 days. Birds navigate during migration using a variety of methods. For diurnal migrants, the sun is used to navigate by day, and a stellar compass is used at night. Birds that use the sun compensate for the changing position of the sun during the day by the use of an internal clock. Orientation with the stellar compass depends on the position of the constellations surrounding Polaris. These are backed up in some species by their ability to sense the Earth's geomagnetism through specialised photoreceptors.[1]

Feeding and drinking:

Generalist is a term granted for Birds that employ many strategies to obtain food or feed on a variety of food items, while specialist is an other term belongs to birds that concentrate time and effort on

specific food items or have a single strategy to obtain food. Birds' diets are varied and often include nectar, fruit, plants, seeds, carrion, and various small animals, including other birds. Birds' feeding strategies vary by species. In Palaeognathae feeding behaviour involves the transmission of quadrate movement to the upper bill by the Pterygoid–Palatinum Complex (PPC). Many birds glean for insects, invertebrates, fruit, or seeds. Some hunt insects by suddenly attacking from a branch. 'Biological control agents' are those species that seek pest insects. They are considered beneficial and their presence encouraged in biological pest control programs. Loons, diving ducks, penguins and auks pursue their prey underwater, using their wings or feet for propulsion, Feeding behaviour of the rhea is typical `Catch and Throw' behaviour, independent of the size of the food item. Nectar feeders such as hummingbirds, sunbirds, lories, and lorikeets have special brushy tongues and bills designed to fit flowers. While aerial predators such as terns plunge and kingfishers dive after their prey. Flamingos and some ducks are filter feeders. Geese and dabbling ducks are primarily grazers.

Some species, including frigatebirds, gulls, and skuas, engage in stealing food items from other birds ‘kleptoparasitism’. Kleptoparasitism is thought to be a supplement to food obtained by hunting. The frigatebirds was estimated stealing on average 5% of their food from Masked Boobies. Some birds like vultures are specialised carrion eaters, while others, like gulls, corvids, or other birds of prey, are opportunists scavengers.

Water is needed by all birds although in general, their mode of excretion and lack of sweat glands reduces the physiological

demands. Some desert birds can obtain their water needs entirely from moisture in their food. Some depend on water sources. Some are particularly well known for their daily congregations at waterholes. The drinking behaviour of the rhea lacks the tongue movement; there is no stationary immersion phase but a scooping motion. Seabirds have salt glands inside the head that eliminate excess salt out of the nostrils and can drink seawater. The general drinking pattern of neognathous birds consists of a fixation phase in which the bird orientates its head, the downstroke phase, where the head is lowered towards the water, the immersion phase, during which the actual water intake takes place, and the upstroke (swallowing) phase . A nutritive fluid called crop milk, the pigeon family, flamingos and penguins are capable to produce and provide to their chicks. Most birds scoop water in their beaks and raise their head to let water run down the throat. Some species belonging to the pigeon, finch, mousebird, families are capable of sucking up water without the need to tilt back their heads. Nesting sandgrouse and many plovers carry water to their young by wetting their belly feathers. Birds do not have sweat glands, but they may cool themselves by moving to shade, standing in water, panting, increasing their surface area, fluttering their throat or by using special behaviors like urohidrosis to cool themselves[(9)] .

Communication:

Birds produce a variety sounds to communicate with flock members, mates or potential mates, neighbors, and family members. They communicate using primarily visual and auditory signals. Signals can

be interspecific between species and intraspecific within species. Songs which are produced in the syrinx, are the major means by which birds communicate with sound. These sounds vary from short, simple call notes to surprisingly long, complex songs. This communication can be very complex; some species can operate the two sides of the syrinx independently, allowing the simultaneous production of two different songs.

Calls are used for a variety of purposes, including mate attraction, evaluation of potential mates, bond formation, the claiming and maintenance of territories, the identification of other individuals, and the warning of other birds of potential predators, sometimes with specific information about the nature of the threat. Mechanical sounds for auditory communication are also used. The Coenocorypha snipes of New Zealand drive air through their feathers, woodpeckers drum territorially, and Palm Cockatoos use tools to drum.

Birds sometimes use plumage to assert social dominance, or to make threatening displays to protect young chicks from predators. Identification of birds, particularly between species is allowed by variation in plumage. The most elaborate displays occur during courtship, where "dances" are often formed from complex combinations of many possible component movements. The success of males' breeding may depend on the quality of such displays.[1]

Resting :

In birds and mammals the metabolic cost of maintaining endothermy is expensive, requiring at least 90% of total metabolism to be devoted to the regulation of body temperature. Birds have a somewhat higher

metabolic rate than mammals[9]. The high metabolic rates of birds during the active part of the day is supplemented by rest at other times. vigilant sleep is a type of sleep sleeping birds often use where periods of rest are interspersed with quick eye-opening "peeks", allowing them to be sensitive to disturbances. When in flight, It has been suggested that there may be certain kinds of sleep which are possible. Swifts are believed to be able to sleep facing the wind in their roosting flight. Some birds have also demonstrated the capacity to fall into slow-wave sleep one hemisphere of the brain at a time. This may allow the eye opposite the sleeping hemisphere to remain vigilant for predators by viewing the outer margins of the flock.. Birds can behaviorally thermoregulate to some extent to reduce heat loss. Roosting sites are often chosen with regard to thermoregulation and safety. Communal roosting is common because it lowers the loss of body heat and decreases the risks associated with predators.

Birds avoid the sun by resting in the hottest part of the day. Wings can be held away from the body and the feathers elevated. Many birds rest on one leg, while some may pull up their legs into their feathers, especially in cold weather. Many sleeping birds place their beaks among their breast feathers, others bend their heads over their backs and tuck their bills in their back feathers,. Perching birds have a tendon locking mechanism that helps them hold on to the perch when they are asleep. Many ground birds, such as quails and pheasants, roost in trees. A few parrots roost hanging upside down.[1] Some hummingbirds go into a nightly state of torpor accompanied with a reduction of their metabolic rates. One species, the Common Poorwill, even enters a state of hibernation.

Breeding:

The breeding season is an ideal time for birding. Ninety-five percent of bird species are socially monogamous. These species pair for at least the length of the breeding season or longer until the death of one mate. Monogamy allows for biparental care, especially in species when females require males' assistance for successful brood-rearing. Breeding usually involves a male performance of courtship display, which might be either quite elaborate or in most displays rather simple and involve some type of song. Females are generally the ones that drive partner selection.

Many birds actively defend a territory from others of the same or different species during the breeding season in order to protect the food source for their chicks. Some species such as seabirds and swifts, often breed in colonies instead to offer protection from predators. Colonial breeders defend small nesting sites, and competition between and within species for nesting sites can be intense. Species that reuse the nest cavities of other birds may breed later in the season so more nesting sites have already been abandoned after earlier successful nests. Nests are usually shaped like cups, domes, plates, beds scrapes, mounds, or burrows. However, some bird nests, are no more than a scrape on the ground. During nest construction, Some species seek out plant matter from plants with parasite reducing toxins to improve chick survival, and feathers are often used for nest insulation.[1]

All birds lay amniotic eggs with hard shells made mostly of calcium carbonate. Depending on nesting conditions species tend to lay white, pale or camouflaged eggs.

Incubation, which optimizes temperature for chick development, usually begins after the last egg has been laid. In monogamous species incubation duties are often shared, whereas in polygamous species one parent is wholly responsible for incubation. Warmth from parents passes to the eggs through areas of bare skin on the abdomen or breast of the incubating birds called brood patches. Much of body weight is lost during incubation period. The warmth for the incubation of the eggs of some species comes from the sun, decaying vegetation or volcanic sources. Incubation periods may range from 10 days in passerine birds to around 75 days in kiwis.[3]

Nature length and of parental care varies widely amongst different orders and species. At one extreme, parental care in some species like megapodes ends at hatching; without parental assistance the newly hatched chick digs itself out and can fend for itself immediately. At the other extreme, the longest extended periods of parental care, being that of the Great Frigatebird, whose chicks take up to six months to fledge and are fed by the parents for up to an additional 14 months. The main purpose of the chick guard stage which describes the period of breeding during which one of the adult birds is permanently present at the nest after chicks have hatched, is to aid offspring to thermoregulate and protect them from predation.[1]

In some species, both parents care for nestlings and fledglings; in others, it is the responsibility of only one sex. In some species, other

members usually close relatives of the breeding pair, will help with the raising of the young. Such alloparenting is particularly common among the Corvida, which includes the true crows, Australian Magpie and Fairy-wrens,. In birds, male parental care is quite common more so than in any other vertebrate class. Though territory and nest site defense, incubation, and chick feeding are often shared tasks, there is sometimes a division of labor in which one mate undertakes all or most of a particular duty.

Economic importance:

Birds have been domesticated by humans both as pets and for practical purposes. Without birds, the effects of pollution would not have been as visible in the 1950's and 1960's. Messenger pigeons, used since at least 1 AD, remained important as recently as World War II. Colorful birds, such as parrots are bred in captivity or kept as pets, a practice that has led to the illegal trafficking of some endangered species. Falcons have long been used for hunting and fishing. Today, such activities are more common for entertainment.

Some birds transport a variety of things through the environment. For example, birds serve to spread seeds of various plants, thereby helping in plant dispersal. Hummingbirds pollinate transporting pollen on their beaks and feathers from one flower to the next. Some wading birds relocate fish eggs that get stuck to their legs, thereby aiding in fish dispersal to other parts of a river or marsh. [(2)]

Domesticated birds raised for meat and eggs, called poultry, are the largest source of animal protein eaten by humans; in 2003, 76 million tons of poultry and 61 million tons of eggs were produced worldwide.

Chickens account for much of human poultry consumption. Many species of birds are also hunted for meat. Bird hunting is primarily a recreational activity. The most important birds hunted include waterfowl, pheasants, wild turkeys, quail, and doves.

Other commercially valuable products from birds include feathers (especially the down of geese and ducks), which are used as insulation in clothing and bedding, and seabird feces (guano), which is a valuable source of phosphorus and nitrogen. The War of the Pacific, sometimes called the Guano War, was fought in part over the control of guano deposits.[1]

Classification of modern bird orders:

This is a list of the taxonomic orders in the subclass Neornithes, or modern birds. The list uses the traditional classification the Clements order.

Subclass Neornithes

The subclass Neornithes has two extant superorders :

A- Superorder Palaeognathae:

The Palaeognathae includes the largest of all living birds. Many palaeognaths are quite large birds, relying on running speed and vicious kicking to defend themselves. Ostrich is the fastest living bipedal runner, Other paleognaths, like the three spacies of kiwi living on New Zealand, are small, shy, retiring creatures **(10)**.

The Palaeognathae consists of two orders which comprise 49 existing species.

- Struthioniformes—ostriches, emus, kiwis
- Tinamiformes—tinamous

B-Superorder Neognathae:

The superorder Neognathae comprises 27 orders which have a total of nearly ten thousand species [1]. The orders comprising the Neognathae are:

1- Pelecaniformes —pelicans.
2- Ciconiiformes—storks .
3- Phoenicopteriformes—flamingos
4- Anseriformes—waterfowl.
5- Falconiformes—falcons, eagles, hawks.
6- Galliformes—fowl.
7- Columbiformes—doves and pigeons.
8- Psittaciformes—parrots.
9- Strigiformes—owls.
10- Coraciiformes—kingfishers .
11- Piciformes—woodpeckers.
12- Passeriformes—passerines, the songbirds or perching birds.
13- Coliiformes—mousebirds
14- Apodiformes—swifts and hummingbirds
15- Sphenisciformes—penguins
16- Charadriiformes—gulls, button-quails, plovers.
17- Gaviiformes—loons
18- Podicipediformes—grebes
19- Procellariiformes—albatrosses, petrels.

20- Phaethontiformes—tropicbirds
21- Cathartiformes—New World vultures
22- Gruiformes—cranes
23- Pteroclidiformes—sandgrouse
24- Cuculiformes—cuckoos and turacos
25- Opisthocomiformes—hoatzin
26- Caprimulgiformes—nightjars.
27- Trogoniformes—trogons

A- Paleognathae Ostrich:

Class: Aves Superorder: Paleognathae Order: Struthioniformes Family: Struthionidae Genus: Struthio Species: S. camelus

The ostrich shares the order Struthioniformes with the kiwis, emus, rheas, and cassowaries. The ostrich is either one or two species of large flightless birds native to Africa, the only living member(s) of the genus Struthio, which is in the ratite family. It is distinctive in its appearance, with a long neck and legs, the fastest land speed of any bird. An ostrich can outrun a horse and kill a human with a single kick**.** It can reach three meters and 135 kilograms. It can run at up to about 70 km/h, The ostrich is the largest living species of bird and lays the largest eggs of any living bird.

The ostrich is farmed around the world, particularly for its feathers, which are decorative and are also used as feather dusters. Its skin is used for leather products and its meat is marketed commercially.

The ostrich's diet consists mainly of plant matter, though it also eats invertebrates. It lives in nomadic groups of 5 to 50 birds. Mating patterns differ by geographical region, but territorial males fight for a harem of two to seven females. [11]

B- Neognathae:

1- Pelecaniformes —pelicans

Kingdom: Animalia Phylum: Chordata Class: Aves Infraclass: Neognathae Order: Pelecaniformes. [12]

Pelecaniformes comprises six families (Phaethontidae (tropicbirds), Sulidae (boobies and gannets), Phalacrocoracidae (cormorants and shags), Anhingidae (anhingas), Pelecanidae (pelicans) and Fregatidae (frigatebirds)), six genera, and 67 species.

The Pelecaniformes are medium-sized and large waterbirds distributed worldwide, primarily in coastal and marine zones. [13] Most have a bare throat patch (gular patch), and the nostrils . They encompass all birds that have feet with all four toes webbed. Habitat varies from pelagic to coastal to inland freshwater environments. They feed on fish, squid or similar marine life. Nesting is colonial, many pelecaniforms breed in mixed colonies with other pelecaniforms, gulls, terns, or penguins. Individual birds are monogamous. The young are altricial, hatching from the egg helpless and naked in most. They lack a brood patch [12]. Predators include humans, birds, rats, cats, dogs, and reptiles.

2- Ciconiiformes—storks :

Kingdom: Animalia Phylum: Chordata Class: Aves Infraclass: Neognathae Order: Ciconiiformes. [14]

The Ciconiiformes are typical wading birds, mostly associated with shallow water, they are large, long-legged wading birds with large bills which allow them to forage in this habitat. This include storks, , herons, egrets, ibises, spoonbills, and several others. The flamingo family, Phoenicopteridae, is related, and is sometimes classed as part of the Ciconiiformes.

Within this framework they show a considerable range of diversity and the feeding habits of Flamingos are considerable different from those of Adjutant Storks. Some species are still totally dependant on water, spoonbills, wood storks, openbill storks and the larger bitterns are good examples of this. Many however have moved partially away from the water. The extreme examples of this are Abdim's Stork and Bald and Hadada Ibises all of which are more terrestrial than aquatic. Most of the species in the Ciconiiformes are communal breeders. Nests are usually built in trees and most colonially nesting species often nest in mixed colonies. Many species have seasonal changes in the colour of their legs and bill during the mating season.

The Ciconiiformes contains a large number of very attractive, relatively large birds and are important not only ecologically but as symbols of a healthy planet. They suffered great reductions in numbers over the last century. The main cause for concern is habitat destruction and because of their size, they are often the

target of hunters who are equipped with modern weapons and lost their innate respect for the natural world. [15]

3- Phoenicopteriformes—flamingos:

Kingdom: Animalia Phylum: Chordata Class: Aves Infraclass: Neognathae Order: Phoenicopteriformes Family: Phoenicopteridae Genus: Phoenicopterus and Phoenicoparrus [16]

There are six species of large wading birds in this order . Flamingos are very social birds; they live in colonies whose population can number in the thousands. They are 3-5 feet tall and have long legs, long necks, and long, bent bills. They often stand on one leg, the other tucked beneath the body. Most species are found in tropical fresh and salt water lagoons and lakes. Flamingoes form strong pair bonds of one male and one female. They are filter feeders feed on algae and small shellfish. Young flamingos hatch with grayish reddish plumage, but adults range from light pink to bright red due to aqueous bacteria and beta-Carotene obtained from their food supply. [16]

4- Anseriformes:

Kingdom: Animalia Phylum: Chordata Class: Aves Superorder: Galloanserae Order: Anseriformes. [17]

Anseriformes is an order of birds. It is comprised 48 genera by about 161 living species in three families: Anhimidae the screamers, Anseranatidae the Magpie Goose, and Anatidae. [18] Anatidae is the largest family, which includes over 140 species of waterfowl, among them the ducks, geese, and swans. All species

in the order are web-footed for efficient swimming and are belong to an aquatic existence at the water surface. Anseriform birds inhabit aquatic environments including lakes, ponds, streams, rivers, swamps and marshes. They are medium to large birds (30-180 cm; 230 g -22.5 kg). The plumage varies from gray or brown to black and white. Anatids may have brightly colored speculums (patch of color on secondaries) in green, bronze, or blue. [17] Screamers are noted for head and neck ornaments. Anseriform birds are herbivorous and feed primarily on leaves, stems, flowers, roots, seeds of aquatic vegetation. They may also forage for insects, plankton, mollusks, crustaceans, and small fish. [18]

5- Falconiformes: "Bird of prey" falcons, eagles, hawks

Kingdom: Animalia Phylum: Chordata Class: Aves Infraclass: Neognathae Order: Falconiformes [19]

"Bird of prey" has a wide meaning that includes many birds that hunt and feed on animals and also birds that eat very small insects. The term here has a narrower meaning for birds that have very good eyesight for finding food, strong feet for holding food, and a strong curved beak for tearing flesh. Most birds of prey also have strong curved talons for catching or killing prey. Birds of prey generally prey on vertebrates, which are usually quite large relative to the size of the bird. Most also eat carrion at least occasionally and the vultures and condors eat carrion as their main food source. By way of an example, the narrower definition excludes storks and gulls, and similarly bird-eating skuas, fish-

eating penguins, and vertebrate-eating kookaburras are excluded. (20)

Birds of prey:

Known as raptors, generally have broad wings well-suited for soaring, are formidable avian predators, armed with powerful talons, hooked bills and acute eyesight. Their eyes are forward-facing forward, an orientation that makes it easier for them to spot prey. Raptors' sharp, hooked bills enables them to tear the flesh of their prey with ease. Raptors hunt by day and feed on a variety of prey including fish, small mammals, reptiles and carrion. The group includes eagles, hawks, kites, the secretary bird, ospreys, falcons and old world vultures and comprises a total of 304 species. (21)

- Eagles tend to be large birds with massive feet and long, broad wings. Booted eagles build very large stick nests and have legs and feet feathered to the toes.
- Kites have relatively weak legs and long wings. They catch live vertebrate prey, but mostly feed on insects or even carrion. They spend much of their time soaring.
- Ospreys, a single species found worldwide that builds large stick nests and specializes in catching fish.
- Buzzards, medium-large raptors with robust bodies and broad wings, also commonly known as "hawks" in North America.
- Harriers are large, slender hawk-like birds with long tails and long thin legs. Gliding on their long broad wings and circling low

over grasslands and marshes, most use a combination of keen eyesight and hearing to hunt small vertebrates.

- The true hawks are mainly woodland birds that hunt by sudden dashes from a concealed perch. They are medium-sized birds of prey that usually belong to the genus Accipiter.
- Falcons are medium-size birds of prey with long pointed wings. Unlike most other raptors, they belong to the Falconidae, rather than the Accipitridae. Many are particularly swift flyers. They lay their eggs on the old nests of other birds; but, sometimes, on cliff ledges or in tree hollows.
- Caracaras are a distinct subgroup of the Falconidae characterized by broad wings, naked faces and appetites of a generalist . They are unique to the New World.
- Vultures are carrion-eating raptors of two distinct biological families: the (Cathartidae), which only occurs in the western Hemisphere the (Accipitridae), which only occurs in the Eastern Hemisphere; and. Members of both groups have either partly or fully naked faces. [20]

6- Galliformes—fowl.

- Kingdom: Animalia Phylum: Chordata Class: Aves Superorder: Galloanserae Order: Galliformes. [22]

This group has about 290 species, one or more of which are found in essentially every part of the world's continents (except for the innermost deserts and perpetual ice). Galliformes is an order of chicken-like birds, characterized by stocky built, small head, strong feet, and often short bills and wings, and adult males have sharp

horny spur on the back of each leg. This order contains such important domestic and game birds as turkeys, grouse, chickens, quails, and pheasants. A number of species have been domesticated, including chickens, turkeys, and guinea fowl, and eggs are a popular food staple. Many are hunted for sport, including a number of species that are reared to be released for hunting. Among the birds that are hunted are wild turkeys, pheasants, and partridges They are important as seed dispersers and predators in the ecosystems they inhabit. Many gallinaceous species are skilled runners and prefer to escape predators by running rather than flying. Males of most species are more colorful than the females. Males often have elaborate courtship behaviors that include strutting, fluffing of tail or head feathers, and vocal sounds. They are mainly non-migratory. [23]

Gallinaceous birds are arboreal or terrestrial animals; many prefer not to fly, but instead walk and run for locomotion. They live up to 30 years in captivity but from 5–8 years in the wild. They can be found worldwide and in a variety of habitats, including forests, deserts, and grassland. They use visual displays and vocalizations for communication, courtship, fighting, territoriality, and brooding.

They are chicken-like in appearance, with rounded bodies and blunt wings, and range in size from small at 15 cm to large at 120 cm. They are mainly terrestrial birds and their wings are short and rounded for short-distance flight. They breed seasonally in accordance with the climate and lay anywhere from 3-16 eggs per year in nests built on the ground or in trees. Gallinaceous birds feed on a variety of plant and animal material, which may include

fruits, seeds, leaves, shoots, flowers, tubers, roots, insects, snails, worms, lizards, snakes, small rodents, and eggs. Most of the galliform birds are resident, but some of the smaller temperate species such as quail do migrate over considerable distances. Altitudinal migration is evidently quite common amongst montane species and a few species of must reach their watering or foraging areas through sustained flight. Hunting and egg collecting has led to over-exploitation of various wild species, and combined with habitat destruction, today 104 of the 281 extant species are listed as Threatened or Near Threatened. [22]

Common species are:

Pheasants, Quail, and Partridges Family Phasianidae The family is divided into four groups: 30 species of new world quail, residing between Paraguay and Canada, 11 species of old world quails in Africa, Australia, and Asia, 94 species of partridges, and 48 species of pheasants. This family includes a wide range of bird sizes from a 5 ½-inch quail to pheasants up to almost 30 inches. Pheasants and quails have heavy, round bodies and rounded wings. They are very fast runners when escaping predators even with their short legs. [22]

Grouse and Ptarmigans Grouse, ptarmigans, and prairie chickens are all part of the family Tetraonidae. They are mainly ground-dwellers and have short, rounded wings for brief flights. They are chicken-like birds with short, curved, strong bills This group includes 25 species residing mostly in North America. [22]

Chachalacas Family Cracidae: Chachalacas are found in the chaparral ecosystems from southern Texas through Mexico and Costa Rica. They have long tails and are chicken-like in appearance. They are large, long-legged, birds that can grow up to 65 cm long. They are mainly arboreal and make their nests in trees 125 to 375 cm above the ground. Their frail looking nests are made out of sticks and leaves. They are popular game birds and domesticated as pets as their flesh is good to eat. Chachalacas feed mainly on berries and insects. [22]

Turkeys Family Meleagrididae Turkeys are large, long-legged birds with naked wrinkled head and feathered body that can grow up to four feet in height and weigh up to 30 lbs in the wild. They have a long broad, rounded tail with 14-19 blunt feathers. [22]

7- Columbiformes—doves and pigeons.

Kingdom: Animalia Phylum: Chordata Subphylum: Vertebrata Class: Aves Order: Columbiformes Family: Columbidae. [24]

Pigeons and doves are a group of birds that includes about 312 species. In general, the terms dove and pigeon are used interchangeably. Dove tends to be used for smaller species and pigeon for larger ones. Pigeons and doves constitute the bird clade Columbidae. Pigeons and doves are small to medium size birds. That exhibit considerable variations in size. They have short legs, a portly body, short neck and small head. [25] The smallest is the New World Ground-Dove, which is the same size as a House Sparrow and weighs as little as 22 g. The largest species is the Crowned Pigeon of New Guinea, at a weight of 2–4kg. They have short, slender bills with

fleshy ceres. Their plumage usually consists of various tones of grey and tan although some species have iridescent swatches of feathers adorning their neck as well as bars and spots on their wings and tail. The wing muscles are strong and comprise 31–44% of their body weight. Wings are large with low wing loadings; pigeons are amongst the strongest fliers of all birds. They are also highly maneuverable in flight. The diet of pigeons and doves consists primarily of seeds and fruit. Pigeons and doves are distributed everywhere on Earth. They are most successful in open habitats such as grasslands, fields, deserts, agricultural lands and urban areas. They have colonized most of the world's oceanic islands. They also inhabit temperate and tropical woodlands and mangrove forests to a lesser extent. [25] This family's greatest variety is in the Indomalaya and Australasia ecozones. About 19% of all species and around 59 species of pigeons and doves are threatened with extinction today. They are threatened by habitat loss, introduced predators, and hunting, or a combination of these factors. Techniques to prevent these extinctions, are employed including the establishment of protected areas to prevent further habitat loss, laws and regulations to control hunting pressure, the establishment of captive populations for reintroduction back into the wild .

Domesticated or hunted pigeon have been used as the source of food since old times. With their powerful breast muscles as characteristic of the family, several species of pigeons and doves are used as food, and make excellent meat. The extinction of the Passenger Pigeon in North America was at least partly due to shooting for use as food.

Depending on species doves and pigeons build platform nests constructed out of twigs and occasionally lined with pine needles or other soft materials such as root fibers and placed in trees, or on the ground. They lay one or two eggs, and both parents care for the young, which leave the nest after seven to 28 days. Both sexes of doves and pigeons produce crop milk secreted by a sloughing of fluid-filled cells from the lining of the crop which provides fats and proteins to feed their young. [24]

8- Psittaciformes—parrots

Kingdom: Animalia Phylum: Chordata Class: Aves Infraclass: Neognathae Superorder: Neoaves (unranked): Eufalconimorphae Order: Psittaciformes. [26]

Characteristic features of parrots include a strong, curved bill, an upright stance, strong legs, and clawed zygodactyl feet with two toes pointing forward and two backward and muscular tongues. [27] Their hinged mandible and muscular tongue allow them to easily move food around in their mouths. Many parrots are vividly colored, and some are multi-colored. They form the most variably sized bird order in terms of length.

Parrots, are of roughly 350 species of colorful birds in 86 genera that make up the order Psittaciformes, found in most tropical and subtropical regions. The order is subdivided into three superfamilies: the Psittacoidea (true parrots), the Cacatuoidea (cockatoos) and the Strigopoidea (New Zealand parrots). They are found in South America, Central America, Asia, Australia, and Africa. Most species live in forests in pairs or small groups. Parrots are found on all

tropical and subtropical continents. Some Caribbean and Pacific islands are home to endemic species. By far the greatest number of parrot species come from Australasia and South America.

Parrots are among the most intelligent birds, and the ability of some species to mimic human speech enhances their popularity as pets. Studies with captive birds have given insight into which birds are the most intelligent. Studies with the African Grey Parrot have shown that some are able to associate words with their meanings and form simple sentences. With a relatively small cerebral cortex, which is the part of the brain considered to be the main area of intelligence in other animals, one argument stands against the supposed intelligent capabilities of bird species. However, birds use a different part of the brain, the medio-rostral neostriatum / hyperstriatum ventrale, as the seat of their intelligence. Some species of parrot are also highly skilled at using tools and solving puzzles. Sound in Parrots is accomplished by expelling air across the mouth of the bifurcated trachea, so different sounds are produced by changing the depth and shape of trachea. African Grey Parrots of all subspecies are known for their superior ability to imitate sounds and human speech. This ability has made them prized as pets from ancient time to the present. Parrots head is large, with eyes positioned high and laterally in the skull, so the visual field of parrots are very wide. Parrots also have quite a wide frontal binocular field for a bird, although this is nowhere near as large as primate binocular visual fields. Seed-eating parrots have a strong tongue containing touch receptors , which helps to manipulate seeds or position nuts in the bill so that the mandibles can apply an appropriate cracking force.

Parrots are popular as pets due to their sociable and affectionate nature, intelligence, bright colors, and ability to imitate human voices. They have also often been misunderstood. Some importers allowed parrots to drink only coffee while they were being shipped believing that their actions would increase survival rates during shipping. it is commonly accepted Nowadays that the caffeine is toxic to birds. Parrots require feeding, grooming, exercise, veterinary care, training, environmental enrichment, and social interaction with other parrots or humans for good health. The intelligence and birds needing by many of the larger kinds of pet parrots has led to be re-homed during the course of their long lifespans. Being cuddly and gentle as juveniles will mature into intelligent, complex, often demanding adults that can outlive their owner. [26]

9- Strigiformes—owls.

Kingdom: Animalia Phylum: Chordata Class: Aves Superorder: Strigimorphae Order: Strigiformes[28]

Owls are a group of birds that belong to the order Strigiformes, variable-sized, distributed among approximately 27 genera and constituting over 200 extant bird of prey species, typically night-specialized hunting birds. They are known for many characteristics, including their well-developed talons, soft plumage, and notoriously silent flight. Their legs are strong, and feathered in many species; they have zygodactyl raptorial feet. [29] They have particularly acute hearing. Owls hunt mostly small mammals, insects, and other birds, although a few species specialize in hunting fish. They are found in all regions of the Earth except Antarctica, most of Greenland, and

some remote islands. All species have a characteristic facial disk, which is circular among strigid owls and heart-shaped in the tytonid owls. [29] Owls have large forward-facing eyes and ear-holes; a hawk-like beak; a flat face; and usually a conspicuous circle of feathers. Their large wings allow them to fly slowly, and their plumage is often cryptic, and many species have different color phases. The stereoscopic nature of the owl's forward-facing eyes permits the greater sense of depth perception necessary for low-light hunting. Although owls have binocular vision, their eyes are more or less fixed in their orbits, supported by a bony sclerotic ring, so they must turn their entire head to change views. Owls are farsighted, unable to see clearly anything within a few centimeters of their eyes. Owls can rotate their heads and necks as much as 270 degrees. Owls have fourteen neck vertebrae as compared to 7 in humans which makes their necks more flexible. Their circulatory systems, permits rotation without cutting off blood to the brain.[28]

Most owls are actively hunting their prey only in darkness. Several types of owl, however, are active during the twilight hours of dawn and dusk. Much of the owls' hunting strategy depends on stealth and surprise. Owls have at least two characters that aid them in achieving stealth. First, the dull coloration of their' feathers can render them almost invisible under certain conditions. Secondly, serrated edges on the wing beats, allowing an owl's flight to be practically silent. Prey is often swallowed whole, and the fur, feathers, and bones are later regurgitated in pellets.

Owls do not build nests, instead they use nests of other species or utilize tree cavities. Some nest on the ground and one species nests in underground burrows dug by mammals.

Encouraging natural predators to control rodent population is a form of pest control, along with excluding food sources for rodents. Placing a new box for owls on a property can help control rodent populations as one family of hungry barn owls can consume more than 3,000 rodents in a nesting season while maintaining the balanced food chain. [28]

10- Coraciiformes—kingfishers

Kingdom: Animalia Phylum: Chordata Class: Aves Infraclass: Neognathae Order: Coraciiform. [30]

This is the most diverse bird order in body weight, ranging from the 5.5 gram (Todus mexicanus) to the 4.5 kg (cumbersome hornbills of southeast Asia), they also vary greatly in size. The Coraciiformes are a group of usually colorful mostly carnivorous near passerine birds including the kingfishers, the Hoopoe, the bee-eaters, the rollers, and the hornbills. [30] Some members of this group are solitary birds while others form large colonies. This order has been seen to be something of a mixed assortment, and the Coraciiformes may be considered as including only the rollers. All the other families would then be considered to represent lineages of birds distantly related to Coraciiformes.

Most kingfishers and their relatives employ a hunting technique referred to as "spot-and swoop" and which consists of the bird sitting

atop a favorite perch waiting to spot their prey. When prey stumbles into range, the bird swoops down to capture their quarry and then returns to the perch for the kill. [31]

Coraciiformes have a large head in relation to the rest of their body. Most have rounded wings. They nest in tree holes or dig tunnels into banks of dirt such as those that line the edges of rivers. [31]

11- Piciformes—woodpeckers :

Kingdom: Animalia Phylum: Chordata Class: Aves Subclass: Neornithes Infraclass: Neognathae Superorder: Neoaves Order: Piciformes. [32]

The Piciformes contain about 67 living genera with a little over 400 species, that include woodpeckers, toucans, jacamars, puffbirds, nunbirds, nunlets, barbets, honeyguides, wrynecks, and piculets. Of which the Picidae (woodpeckers) make up about half. In general, the Piciformes are insectivorous, although the barbets and toucans mostly eat fruit and the honeyguides are unique among birds in being able to digest beeswax although insects make up the bulk of their diet. [32] Like parrots, woodpeckers and their relatives have zygodactyl feet, which means that of their four toes, two face forward and two face backwards. This arrangement enables woodpeckers to grasp onto and climb tree trunks with ease. Many Piciformes have strong legs and a sturdy tail, that enable them to grasp tightly to vertical surfaces such as tree trunks. [33] They range in size from the Rufous Piculet at 8 centimetres in length, and weighing 7 grams, to the Toco Toucan, at 63 centimetres long, and weighing 680 grams.[32]

12- Passeriformes—passerines, the songbirds or perching birds.

Kingdom: Animalia Phylum: Chordata Class: Aves Superorder: Neoaves Division: Terrestrornithes (unranked): Dendrornithes (unranked): Anomalogonates Subsection: Picoclamatores Superorder: Passerimorphae Order: Passeriformes. [34]

The passerines (Perching birds) form one of the most diverse terrestrial vertebrate orders; with over 5,500 identified species, account for more than half of all bird species alive today. [35] The names "passerines" are derived from the Latin term passer for Passer sparrows. A passerine is a bird of the order Passeriformes, has roughly twice as many species as the largest of the mammal orders, the Rodentia. Sometimes known as songbirds, the passerines contain more than 110 families, the second most of any order of vertebrates. [34]

The foot of a passerine consists of four long, thin toes. Three toes face forward and one faces backwards. This arrangement (anisodactyl arrangement) enables the passerine birds to perch upon vertical surfaces, such as trees and cliffs. Most passerine birds develop twelve tail feathers. Most passerines are monogamous and lay colored eggs. The chicks of passerines are blind, featherless, and helpless when hatched from their eggs. Passerines provide their young with a good deal of parental care. [35]

Passerines vary widely in their appearance. Most members of the group are small in size. The largest members of the group are the crows and ravens which can grow to 25 inches in length.

Crows:

Kingdom: Animalia Phylum: Chordata Class: Aves Subclass: Neornithes Infraclass: Neoaves Order: Passeriformes Suborder: Passeri Infraorder: Corvida Superfamily: Corvoidea Family: Corvidae[36]

Corvids are large to very large passerines with a robust build, strong legs and all species except the jay have nostrils covered by bristle-like feathers. Many corvids have mainly black or blue coloured plumage; however, some are black and white, some have a blue-purple iridescence and many tropical species are brightly colored. The sexes are very similar in color and size. Their family includes the largest members of the passerine order. Corvids occur in most climatic zones. Most are sedentary and do not migrate significantly. However, during a shortage of food, eruptive migration can occur. When species are migratory, they will form large flocks in the fall and travel south. The natural diet of many corvid species is omnivorous, including invertebrates, nestlings, small mammals, berries, fruits, seeds, and carrion. Some corvids are predators of other birds. During the wintering months, corvids typically form foraging flocks.[36] However, some crows also eat many agricultural pests including cutworms, wireworms, grasshoppers, and harmful weeds. Some corvids eat carrion, and since they lack a specialized beak for tearing into flesh, they wait until animals are opened, by other predators. Young corvids have been known to play and take part in elaborate social games. Documented group games follow a follow the leader type pattern. Other play involves the manipulation, passing, and balancing of sticks. The brain-to-body weight ratios of corvid brains

are among the largest in birds, equal to that of most great apes and cetaceans, and only slightly lower than a human. Their intelligence is boosted by the long growing period of the young. By remaining with the parents, and since most corvids are cooperative brooders, the young have more opportunities to learn necessary skills from different members of the group. When compared to dogs and cats in an experiment testing the ability to seek out food, corvids out-performed the mammals.) A meta-analysis testing found corvids to be the most innovative birds by inventing new ways to acquire food in the wild. A 2004 review suggests that their cognitive abilities are equivalent with those of great apes. The Eurasian Magpie is one of the few species known to be able to recognize itself in a mirror test. Other examples of corvid cleverness: One Carrion Crow was documented cracking nuts by placing them on a crosswalk, letting the passing cars crack the shell, waiting for the light to turn red, and then safely retrieving the contents. With their spatial memories, Corvids have been recorded to recall their perishable food's hiding place up to nine months later. This has been compared to episodic memory, previously thought unique to humans. (36)

Swallow:

Kingdom: Animalia Phylum: Chordata Class: Aves Order: Passeriformes Suborder: Passeri Family: Hirundinidae(37)

The swallows and martins are a group of passerine birds in the family Hirundinidae. This family comprises two subfamilies: Pseudochelidoninae including the river martins of the genus Pseudochelidon and Hirundininae includes all other swallows and

martins. The swallows have a cosmopolitan distribution across the world. Africa still has the greatest diversity of species.

The most common hirundine plumage is glossy dark blue or green above and plain or streaked underparts, often white or rufous. Swallows are excellent flyers, and use these skills to feed and attract a mate. They defend their nesting site, the males select a nest site, and then attract a female using song and flight, and dependent on the species guard their territory. Even if a human being gets too close to their territory, swallows will attack them within the perimeter of the nest. Swallows mostly are insectivorous, taking flying insects on the wing. They avoid stinging insects such as bees and wasps. On occasion the swallows snap prey off branches or on the ground but generally, forage for prey that is on the wing. In addition a number of species will occasionally consume fruits and other plant matter. Swallows are monogamous, and during the breeding season pairs defend the nest most vigorously. Non migratory species often stay near their breeding area all year.

Swallows are tolerated by humans because of their beneficial role as insect-eaters, and some species such as Barn Swallow and House Martinare now nesting in and around human habitation and rarely use natural sites. [37]

13- Coliiformes Mousebirds:

Kingdom: Animalia Phylum: Chordata Class: Aves Subclass: Neornithes Infraclass: Neognathae Superorder: Neoaves Order: Coliiformes Family: Coliidae [38]

This group is confined to sub-Saharan Africa, and is the only bird order confined entirely to that continent. Mousebirds are slender grayish or brown birds with soft, hairlike body feathers. They are gregarious, and are found in bands of about twenty in lightly wooded country. They are typically about 10 cm in body length, with a long, thin, tail a further 20–24 cm in length, and weigh 45–55 grams. All species have strong claws and reversible outer toes.

14- Apodiformes—swifts and hummingbirds

Kingdom: Animalia Phylum: Chordata Class: Aves Subclass: Neornithes Infraclass: Neognathae (unranked): Cypselomorphae Order: Apodiformes Family: Trochilidae. [39]

They are known as hummingbirds because of the humming sound created by their beating wings, which sometimes sounds like bees or other insect. Hummingbirds are birds that are very small and have short legs and tiny feet. [40] Most species measuring in the 7.5–13 cm range. Indeed, the smallest extant bird species is the 5-cm Bee Hummingbird. The feet of the birds in this order are bare skin with no scales. [40] Individuals from some species of hummingbirds weigh less than a gram. They hover in mid-air by rapidly flapping their wings 12–80 times per second. They can fly at speeds exceeding 54 km/h. they are also the only group of birds with the ability to fly backwards. To conserve energy while they sleep or when food is scarce, they have the ability to go into a hibernation-like state where their metabolic rate is slowed to 1/15th of its normal rate. When the nights get colder, their body temperature can drop significantly, thus burning much less energy overnight. As the day heats back up, the

hummingbirds' body temperature will come back up and they resume their normal activity. [39]

Hummingbirds pollinate various nectar-producing plants, transporting pollen on their beaks and feathers from one flower to the next. They drink nectar, a sweet liquid inside certain flowers. Like bees, they are able to assess the amount of sugar in the nectar they eat; they reject flower types that produce nectar less than 10% sugar. Nectar is a poor source of nutrients, by preying on insects and spiders, hummingbirds meet their needs for protein, amino acids, vitamins, minerals, etc. Most hummingbird species have bills that are long and straight. When hummingbirds feed on nectar, the bill is usually opened only slightly, allowing the tongue to dart out and into the interior of flowers. High-speed photography has revealed that a hummingbird's tongue's tubes open down their sides, and close around nectar causing the bird to drink. Hummingbirds do not spend all day flying, as the energy cost would be much; they spend an average of 10–15% of their time feeding and 75–80% sitting and digesting. They feed in many small meals, consuming many small invertebrates and up to twelve times their own body weight in nectar each day. Their young are blind, naked, and helpless at birth. [39]

Seabirds

Following are the groups of birds normally classed as seabirds:

Sphenisciformes, Procellariiformes, Pelecaniformes and Charadriiformes.

The open sea covers about 70% of the earth to an average depth of about 2 miles. Some 312 species of birds in 17 families live in this within aquatic environment. [41] In general, seabirds also known as marine birds are different from those of land birds. seabirds live longer anywhere between twenty and sixty years, breed later, delay breeding for longer for up to ten years, and have fewer young than other birds do. They invest a great deal of time in their young. Seabirds include the Penguins, Fulmars, Prions (Whalebirds), Shearwaters, Boobies, Gannets, Puffins, Auks, Razorbills, Murres, Dovekies, Guillemots, Auklets, Murrelets, Gulls, terns, and some ducks and geese. [42] Seabirds can be coastal, or spend a part of the year away from the sea entirely. When nesting, colonies can vary in size from a few dozen birds to millions. Many species are famous for undertaking long annual migrations. They feed both at the ocean's surface and below it, and even feed on each other. The one common characteristic that all seabirds share is that they feed in saltwater. Longer wings and low wing loading are typical of more pelagic species, whilst diving species have shorter wings. Seabirds also almost always have webbed feet, to aid movement on the surface as well as assisting diving in some species. The Procellariiformes are unusual amongst birds in having a strong sense of smell, which is used to find widely distributed food in a vast ocean. [43] Salt glands are used by seabirds to deal with the salt they ingest by drinking and feeding, and to help them osmoregulate. The excretions from these glands are almost pure sodium chloride. The plumage of most seabirds is less colorful than that of land birds, restricted in the main to variations of black, white or gray. A few species such as some penguins have colorful plumes, but most of the color in seabirds

appears in the bills and legs. The dense plumage protects the bird from getting wet, and down feathers protect from cold. Compared to land birds, seabirds have far more feathers protecting their bodies.

Care of young is elongated, extending for as long as six months. It is among the longest for birds. The frigatebirds have the longest period of parental care of any bird, with continued assistance after chicks fledging for up to fourteen months. Due to the extended period of care, breeding occurs in some species every two years rather than annually. Pairs are seasonally monogamous. Both parents participate in caring for the young, and Many species, such as gulls and penguins, retain the same mate for several seasons, while many petrel species mate for life. Ninety-five percent of seabirds are colonial, With over a million birds recorded, their colonies are amongst the largest bird colonies in the world. Several different species In most seabird colonies will nest on the same colony. Competition can be strong both within species and between species, with aggressive species pushing less dominant species out of the most desirable nesting spaces. Many seabirds return to the same nest or site for many years increasing breeding success by providing a place for returning mates to reunite, and reducing the costs of prospecting for a new site. Young adults breeding for the first time usually often nest close to where they hatched. There are disadvantages to colonial life, particularly the spread of disease. Colonies also attract the attention of predators, principally other birds, that is why many species attend their colonies nocturnally to avoid predation. Due to direct conflict with man on land, man and his domestic predators, contributed to many historic breeding colonies being wiped out. Seabirds often migrate after the breeding season.

Migration distance at sea is determined by the availability of food. In young seabirds if oceanic conditions are unsuitable, they sometimes will emigrate permanently to more productive areas Some species, such as the auks, drift southwards as the winter approaches. [43] Other species undertake trans-equatorial trips, both from the north to the south, and vice versa.

Seabirds and humans have a long history together, and both have drawn benefits and disadvantages from the relationship. In fact, the known association of seabirds with land was instrumental in allowing the Polynesians to locate tiny landmasses in the Pacific. Seabirds have provided food for fishermen away from home. [43] Indirectly, fisheries have also benefited from guano from colonies of seabirds acting as fertilizer for the surrounding seas. Negative effects on fisheries are mostly restricted to raiding by birds although long-lining fisheries also have to deal with bait stealing. Seabirds are not safe at sea, tens of thousands are drowned when they are entangled in open sea drift nets

15-Sphenisciformes—penguins:

Kingdom: Animalia Phylum: Chordata Class: Aves Infraclass: Neognathae Order: Sphenisciformes Family: Spheniscidae [44]

Explorers noticed the penguin similar appearance to the Great Auk of the northern hemisphere, and named them after this bird. Penguins are a group of aquatic, flightless birds living almost exclusively in the southern hemisphere, especially in Antarctica where they catch their food underwater and raise their young on land.

Their distinct tuxedo-like appearance is called countershading, a form of camouflage that helps keep them safe in the water and their wings are like flippers extremely suited to swimming. [45]

Most penguins feed on krill, fish, squid and other forms of sealife caught while swimming underwater. They are accustomed to life in the water. They spend about half of their lives on land and half in the oceans.

Several species are found in the temperate zone, and one species, the Galápagos Penguin, lives near the equator . Among extant penguins, larger penguins inhabit colder regions, while smaller penguins are generally found in temperate or even tropical climates. The largest living species is the Emperor Penguin which is about 1.1 m tall and weigh 35 kg or more. The smallest penguin species is The blue penguin, also known as the fairy penguin, which stands around 40 cm tall and weighs 1 kg. At least one giant penguin occurred in a region not quite 2,000 km south of the equator in a climate decidedly warmer than today. Penguin varies among 20 living species, in a life span between 15-20 years. The penguin species with the highest population is the Macaroni penguin with 11,654,000 pairs. The species with the lowest population is the endangered Galapagos penguin with between 6,000-15,000 individuals. Within the smooth plumage a layer of air is preserved, ensuring buoyancy. It also helps insulate the birds in cold waters. Small penguins usually catch their prey near the surface; they in dives that normally last only one or two minutes. Diving penguins reach 6 to 12 km/h though there are reports of velocities of 27 km/h. Penguins can spend up to 75% of their lives in the water. They do all of their hunting in the water. Their

prey can be found within 60 feet of the surface, so penguins have no need to swim in deep water. They catch prey in their beaks and swallow them whole as they swim. Some species only leave the water for molting and breeding. Penguins have an average sense of hearing for birds;[this is used by parents and chicks to locate one another in crowded colonies.[44)] Their eyes are suited for underwater vision, and are their primary means of locating prey and avoiding predators; in air they are nearsighted, Penguins either waddle on their feet or slide on their bellies across the snow, a movement called "tobogganing", which conserves energy while moving quickly. They also jump with both feet together. They can drink salt water because their supraorbital gland filters excess salt from the bloodstream. The salt is excreted in a concentrated fluid from the nasal passages. [44)]

The Emperor Penguin (the largest penguin) breeds in the coldest environment of any bird species; air temperatures may reach -40° (C), and wind speeds may reach 144 km/hr. In the extreme cold of the Antarctic winter, the females are at sea fishing for food leaving the males to brave the weather by themselves. They often huddle together to keep warm and rotate positions to make sure that each penguin gets a turn in the center of the heat pack. Penguins are able to control blood flow to their extremities, reducing the amount of blood that gets cold, but still keeping the extremities from freezing. Penguins breed in large colonies, these colonies may range in size from as few as a 100 pairs to several hundred thousand in the case of King, Macaroni and Chinstrap Penguins. Penguins are social birds. Many species feed, swim and nest in groups. During the breeding season, some species form large groups, or “rookeries”, that include thousands of penguins. Each penguin has a distinct call, allowing

individuals to find their mate and their chicks even in large groups. Agonistic displays are those intended to confront or drive off, or alternately appease and avoid conflict with, other individuals. Penguins form monogamous pairs for a breeding season. Most penguins lay two eggs in a clutch, although the two largest species, the Emperor and the King Penguins, lay only one. With the exception of the Emperor Penguin, all penguins share the incubation duties. Penguin eggs are smaller than any other bird species when compared proportionally to the weight of the parent birds. When mothers lose a chick, they sometimes attempt to steal another mother's chick. [44]

Penguins are popular around the world, primarily for their unusually upright, waddling gait and lack of fear of humans. Tourists are not supposed to approach penguins closer than 3 meters, at which point they become nervous.

16-Charadriiformes—Gulls

Kingdom: Animalia Phylum: Chordata Class: Aves Order: Charadriiformes Suborder: Lari Family: Laridae. [46]

Shorebirds (Charadriiformes) are a group of about 350 species of birds that include sandpipers, plovers, avocets, gulls, terns, auks, skuas, oystercatchers jacanas and phalaropes. No discussion of seabirds would be complete without a mention of the 45 species of Gulls that occur worldwide. These birds, mostly of coastal regions, are perhaps the most familiar of the seabirds. (42)

Seagulls are typically medium to large seabirds, usually gray or white, often with black markings on the head or wings. Gull species range in size from the Little Gull, at 120 g and 29 cm, to the Great Black-backed Gull, at 1.75 kg and 76 cm. Two years is typical for small gulls to attain full adult plumage, but the large species take up to four years. They are generally with heavy bodies, long wings, moderately long necks . They have unhinging jaws which allow them to consume large prey. The bill is generally heavy and slightly hooked. The bill color is often yellow for white-headed species and red, dark red or black in the smaller species. The gulls are generalist feeders. The tails of most species are rounded. In the air they are able to take off quickly with little space. Gulls have moderately long legs with fully webbed feet. The walking gait of gulls includes a slight side to side motion, something that can be exaggerated in breeding displays.

Gulls are typically coastal or inland species, rarely venturing far out to sea. They breed on every continent, including the margins of Antarctica, and are found in the high Arctic as well. They are less common on tropical islands. Large White-headed gulls are long-lived birds, with a maximum age of 49 years. Most gull species are migratory, with birds moving to warmer habitats during the winter. Some species migrate long distances, like the Franklin's Gull, which migrates from Canada to wintering grounds in the south of South America. Other species move much shorter distances and may simply disperse along the coasts near their breeding sites.

Gulls are resourceful, inquisitive and intelligent birds, demonstrating complex methods of communication and a highly developed social structure. For example, many gull colonies display mobbing behavior, attacking and harassing predators and other intruders. Certain

species have exhibited tool use behavior, using pieces of bread as bait with which to catch goldfish. Many species of gull have learned to coexist successfully with humans and have thrived in human habitats. Gulls have been observed preying on live whales, landing on the whale as it surfaces to peck out pieces of flesh.

The food taken by gulls includes fish and marine and freshwater invertebrates, both alive and already dead, terrestrial arthropods and invertebrates such as insects and earthworms, rodents, eggs, carrion, offal, reptiles, amphibians, plant items such as seeds and fruit, human refuse, and even other birds. No gull species is a single-prey specialist, and no gull species forages using only a single method. Prey can be obtained in the air, on water or on land. In the air a number of hooded species are able to hawk insects on the wing; larger species perform this feat more rarely. Gulls on the wing will also snatch items both off water and off the ground, and over water they will also plunge-dive to catch prey. Smaller species are more maneuverable and better able to hover-dip fish from the air. Dipping is also common when birds are sitting on the water, and gulls may swim in tight circles or foot paddle to bring marine invertebrates up to the surface. Food is also obtained by searching the ground, often on the shore among sand, mud or rocks. Larger gulls tend to do more feeding in this way. In shallow water gulls may also engage in foot paddling. A unique method of obtaining prey to gulls involves dropping heavy shells of clams and mussels onto hard surfaces.[157) There is apparently a learnt component to the task as older birds are more successful than younger ones. Gulls have only a limited ability to dive below the water in order to feed on deeper prey. In order to obtain prey from deeper down, when hunting marine hunters drive

prey to the surface where many species of gull feed in association. Examples of such associations include four species of gull feeding around plumes of mud brought to the surface by feeding Grey Whales, and also between Orcas and Kelp Gulls. It has been suggested that the time taken to learn foraging skills explains the delayed maturation in gulls.

Gulls possess exocrine glands located in supraorbital grooves of the skull. They can drink salt water as well as fresh water, by which sodium chloride can be excreted through the nostrils to assist the kidneys in maintaining electrolyte balance.

Gulls are monogamous and colonial breeders that display mate fidelity that usually lasts for the life of the pair. Most gulls breed once a year and have predictable breeding seasons lasting for three to five months. They return to the same colony after breeding there once and even usually breeding in the same location within that colony. Colonies can vary from just a few pairs to over a hundred thousand pairs, and may be exclusive to that gull species or shared with other seabird species. Existing pairs re-establish their pair-bonds, and unpaired birds begin courting. A few species nest singly, and single pairs of Band-tailed Gulls may breed in colonies of other birds. Gulls defend their territories from rivals of both sexes through calls and aerial attacks. This area can be as large as a 5 m radius around the nest in the Herring Gull to just a tiny area of cliff ledge in the kittiwakes.

After laying 1-3 eggs incubation lasts between 22 and 26 days, and begins after laying the first egg, although it is discontinuous until the second egg is laid. This means the first two chicks are born close together, and the third chick some time later. Young chicks are

brooded by their parents for about one or two weeks, and are often at least one parent will remain with them until they fledge in order to guard them. Both parents feed the chicks, although early on in the rearing period the male does most of the feeding and the female most of the brooding and guarding. [46]

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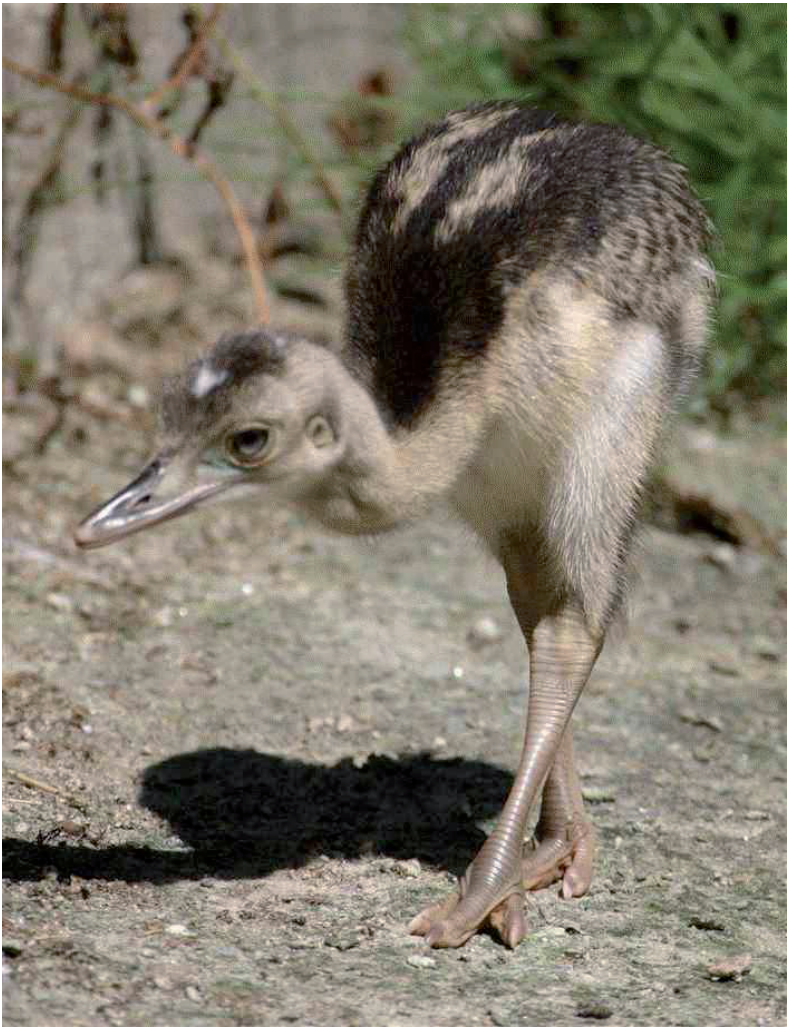
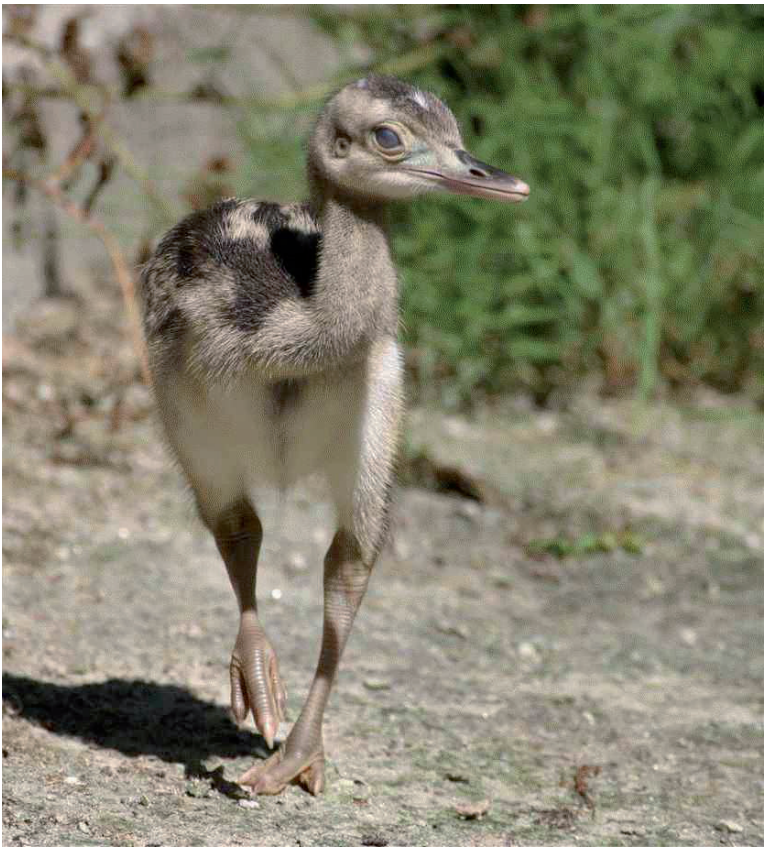
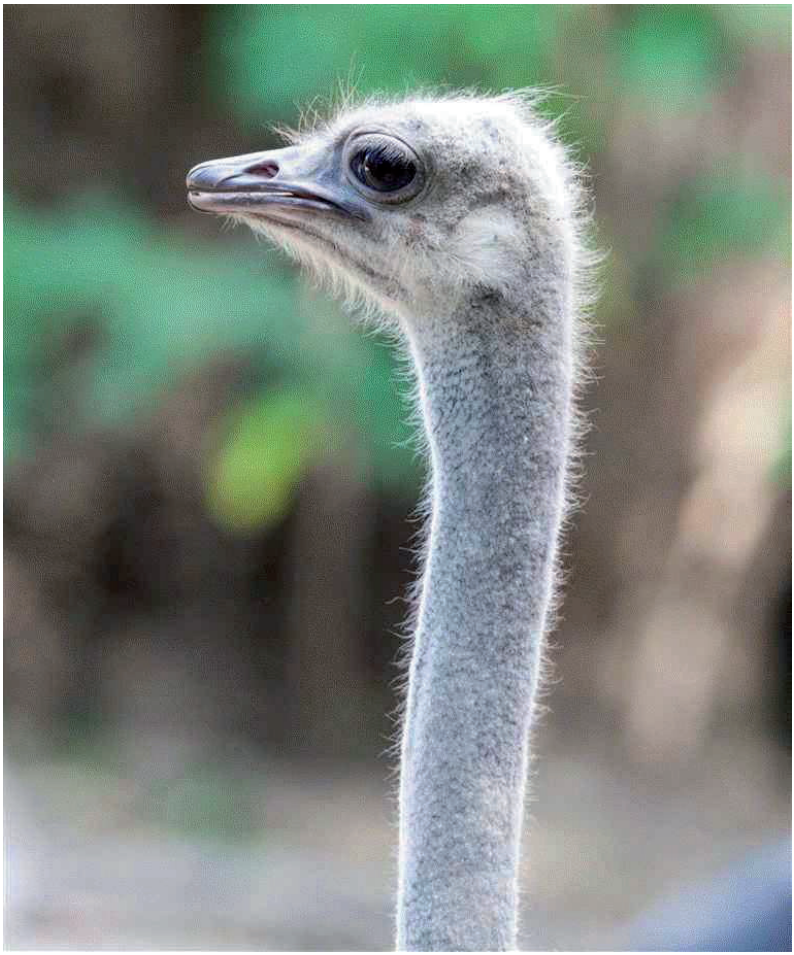
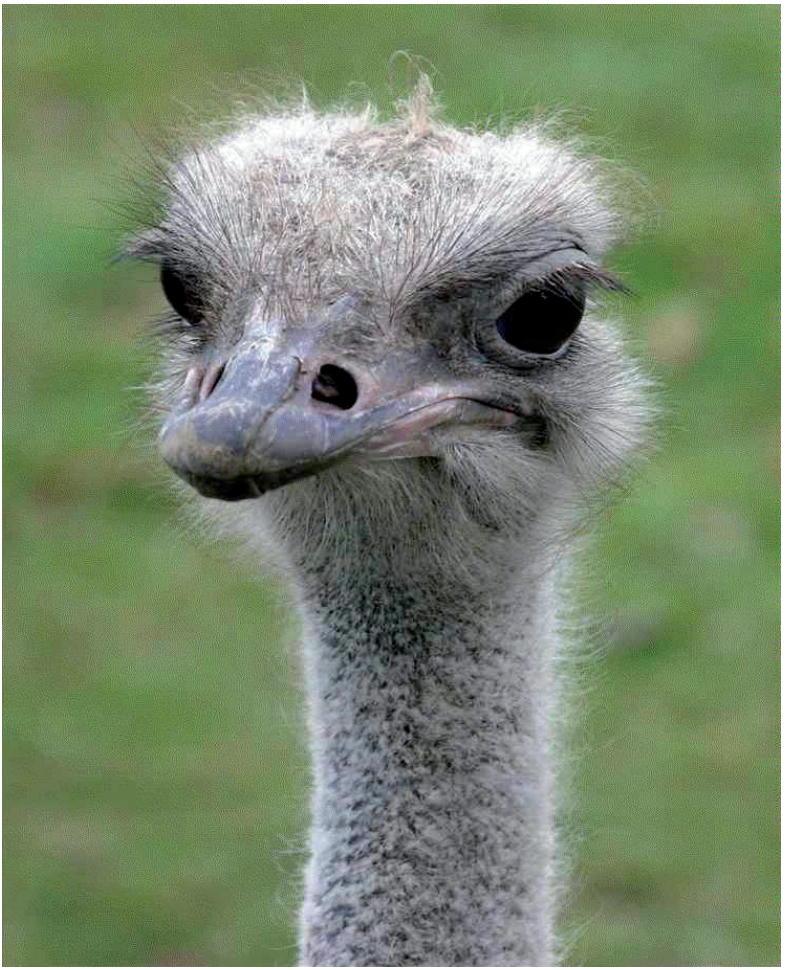








2- Rhea

B- Neognathae

1- Pelecaniformes:

2- Ciconiiformes:

HERON, GREY

HERON, GREEN

STORK, WHITE

STORK, WHITE

AVOCET

EGRET, GREAT WHITE

EGRET, LITTLE

IBIS, GLOSSY

Black STORK

3- Phoenicopteriformes—flamingos:

Flamingo

4- Anseriformes

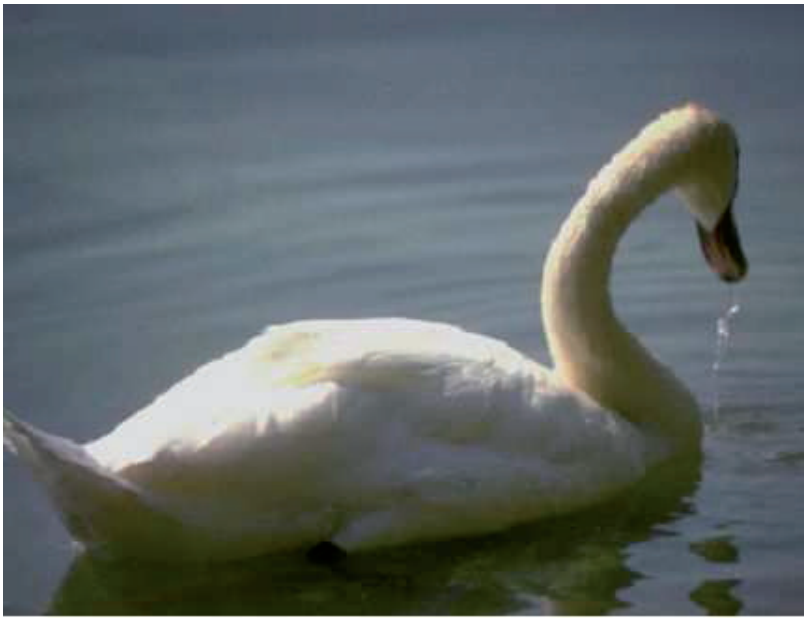
A- Swan

Swan

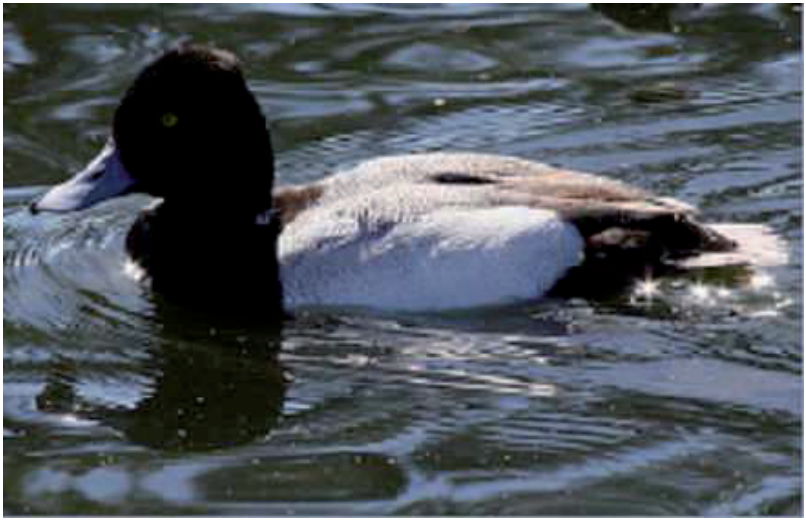
Swan

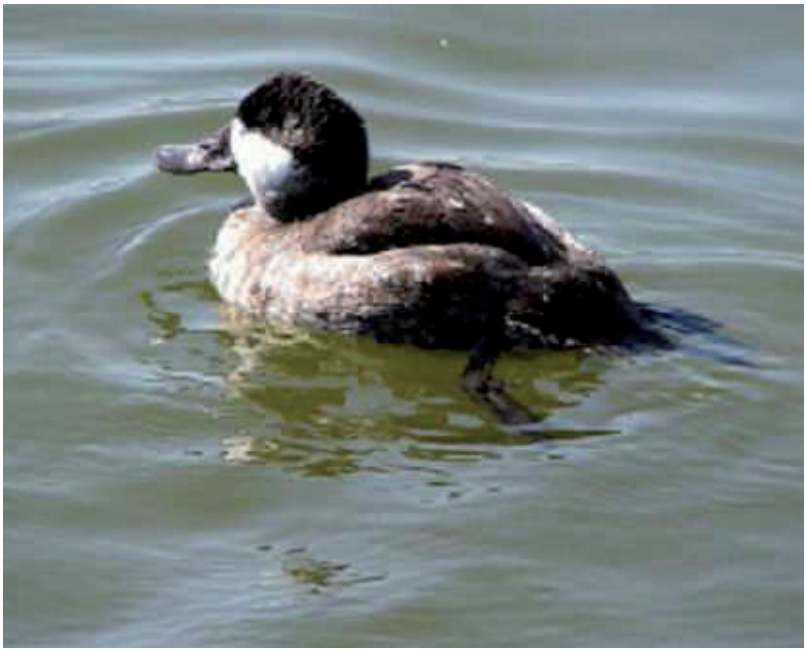
SWAN, WHOOPER

SWAN, MUTE

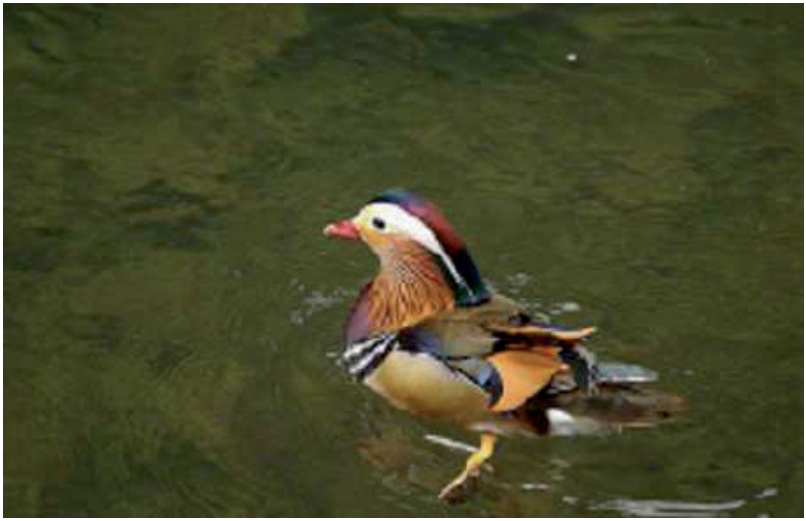


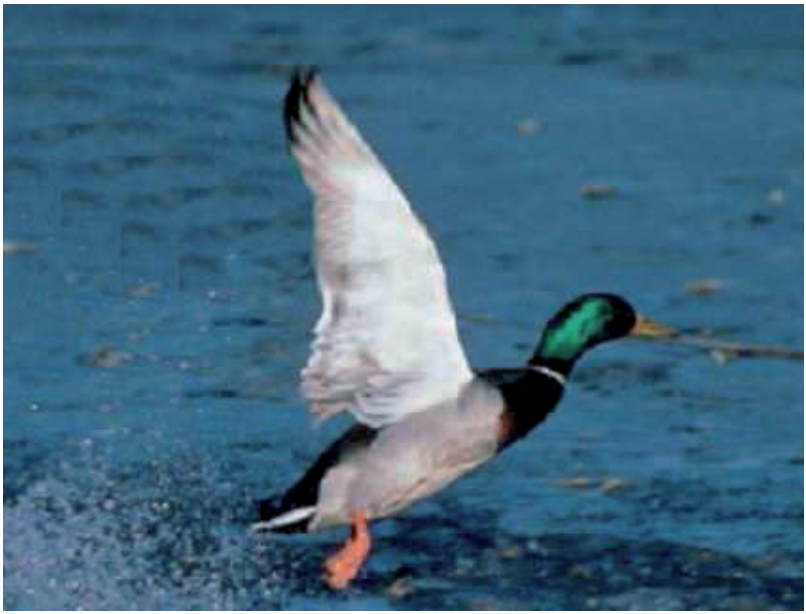
B- Ducks

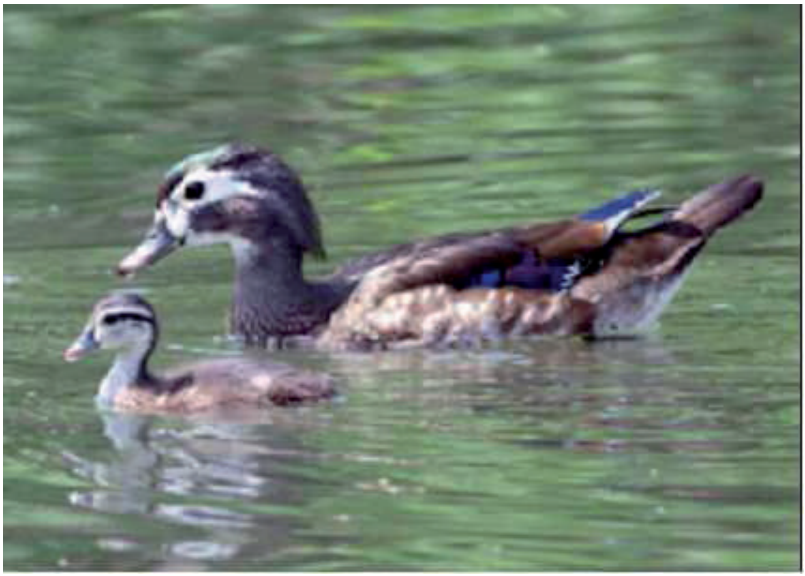




DUCK, MANDARIN

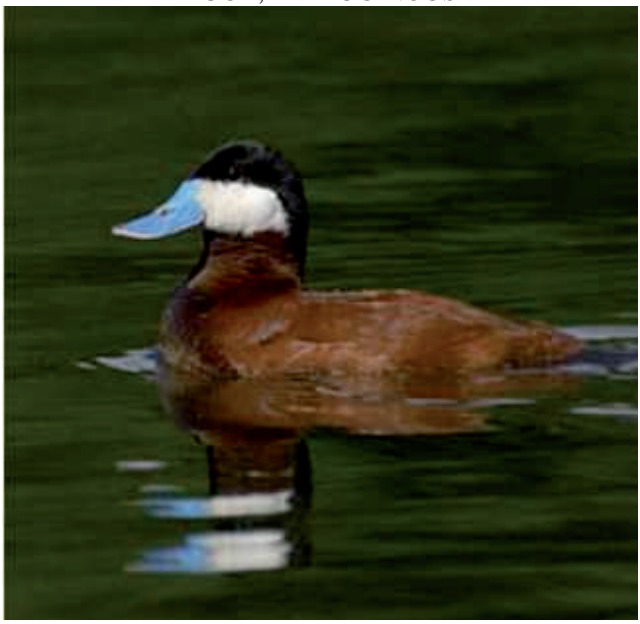






Coot

DUCK, FERRUGINOUS



DUCK, Ruddy

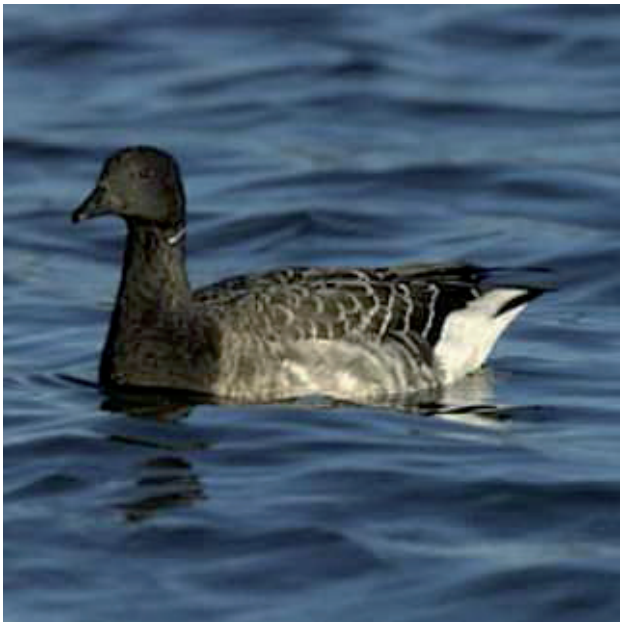
SMEW

TEAL, COMMON

C- Goose

GOOSE, SNOW

Richardson Goose

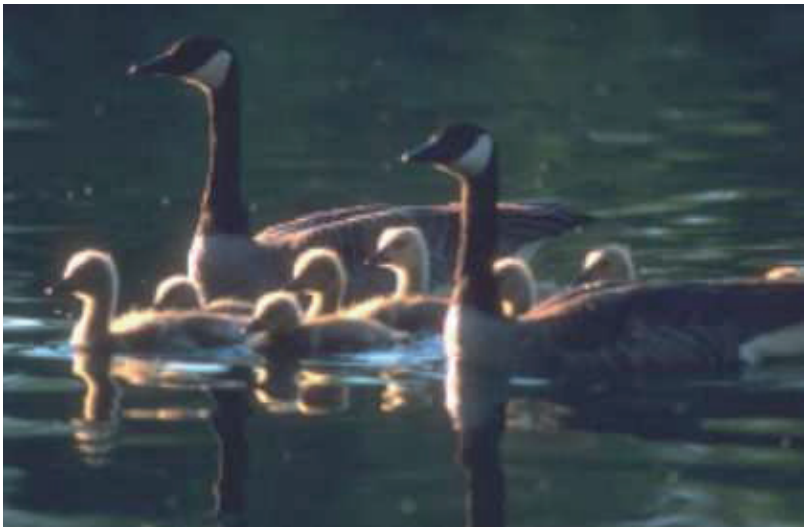


PALE BELLIED BRENT

GOOSE, PINK FOOTED

Egyptian

GOOSE, BARNACLE



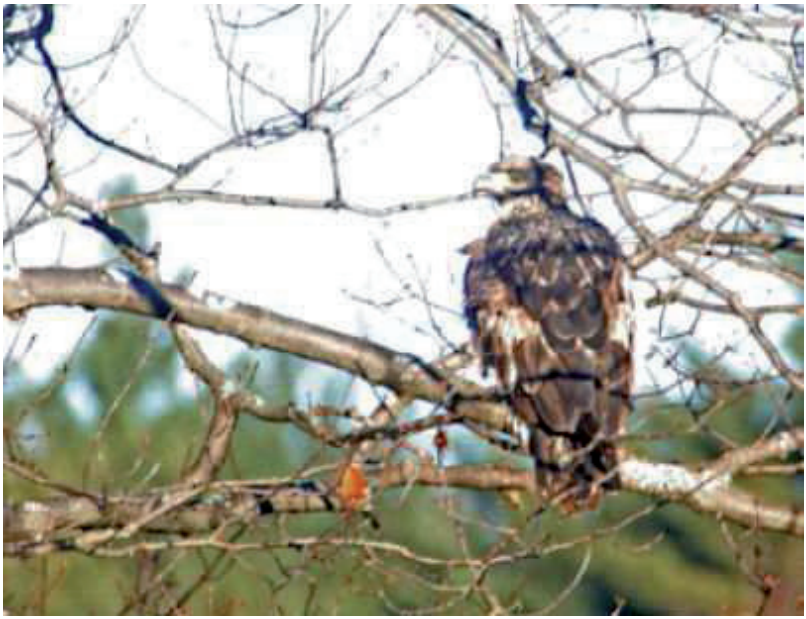
5 Falconiformes:

A- Eagles

Black Eagle

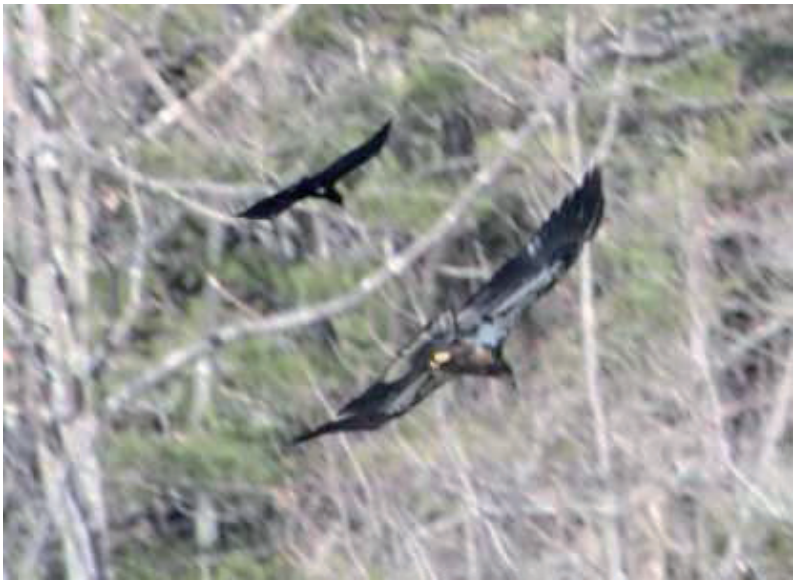
Black Eagle

Brown Eagle



Brown Eagle

Brown Eagle



B- Hawk

Harris Hawk

Harris Hawk

Harris Hawk

Harris Hawk

Hawaiian Hawk

Red Tailed Hawk

Red Tailed Hawk

Red Tailed Hawk

Red Tailed Hawk

Red Tailed Hawk

Red-shouldered Hawk

Red-shouldered Hawk

C- Falcons

Dwarf Falcon

Falcon

Falcon

Falcon

Falcon

Falcon

Falcon

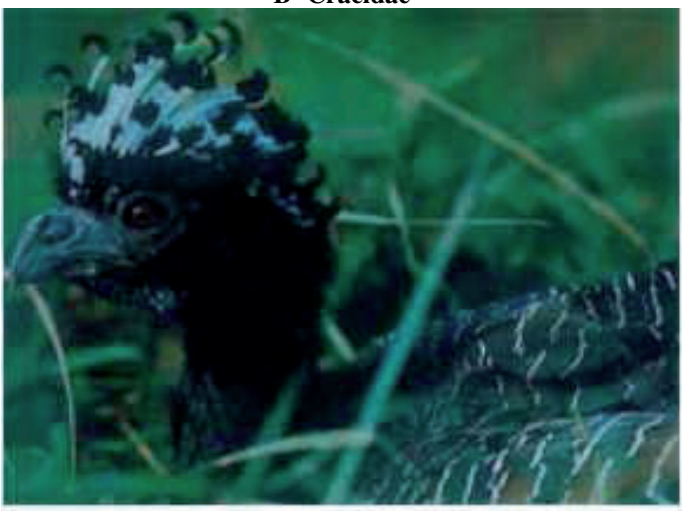
Falcon

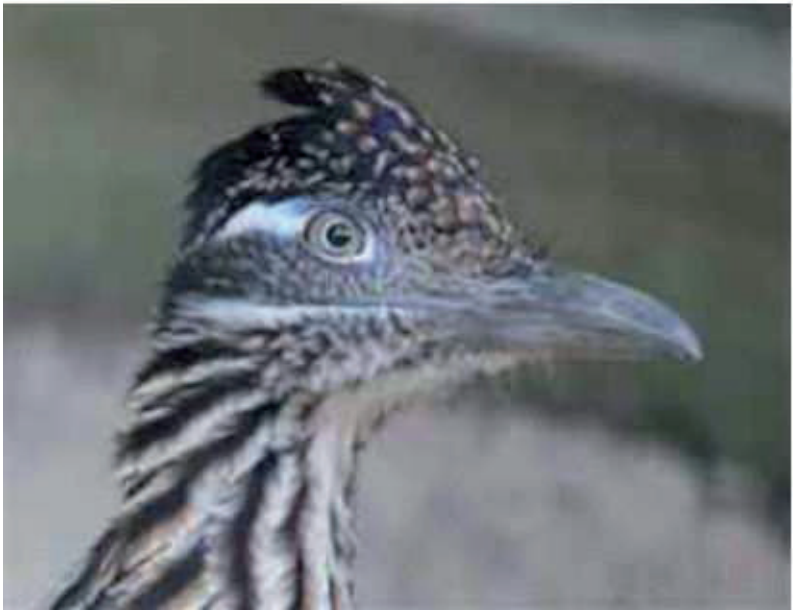
Falcon

6: Galliforme

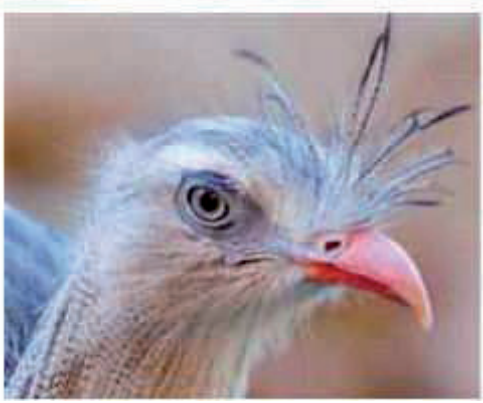
A- Megapodidae:

B- Cracidae

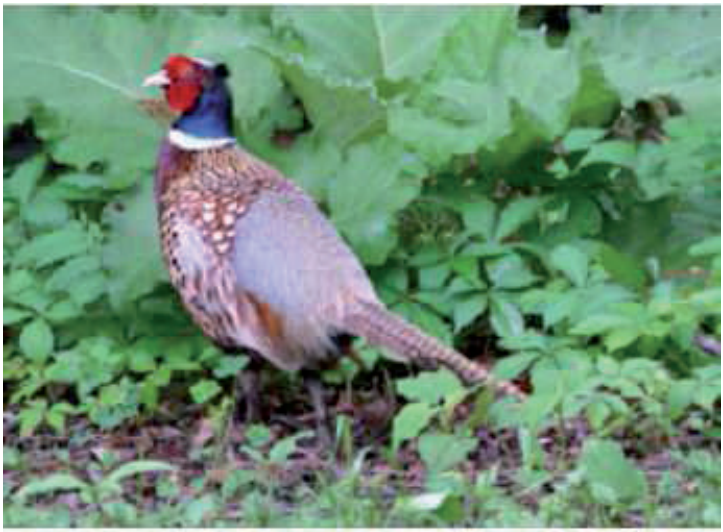


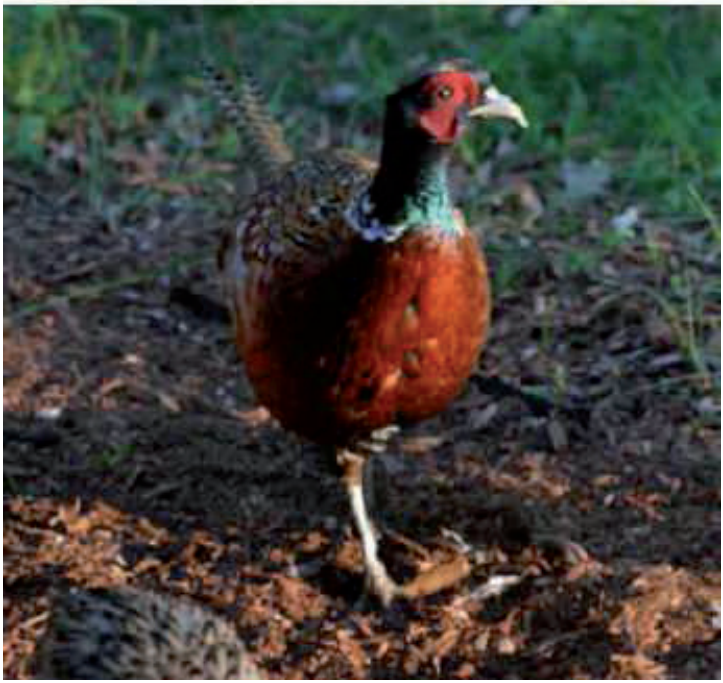


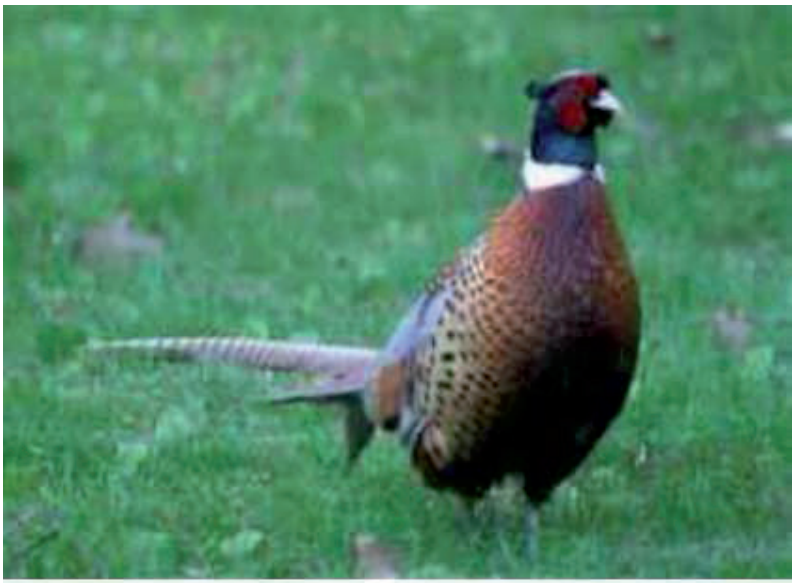
C :Tetranoidae

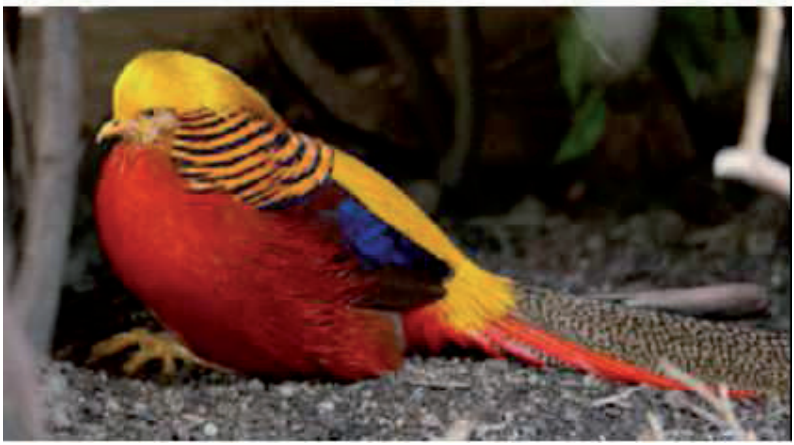


D:Phasianidae

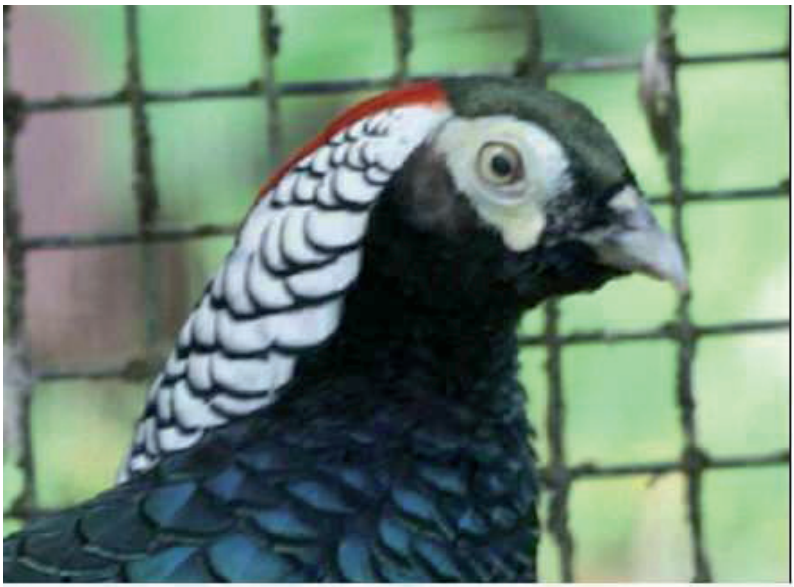








Lady Amherst's Pheasant

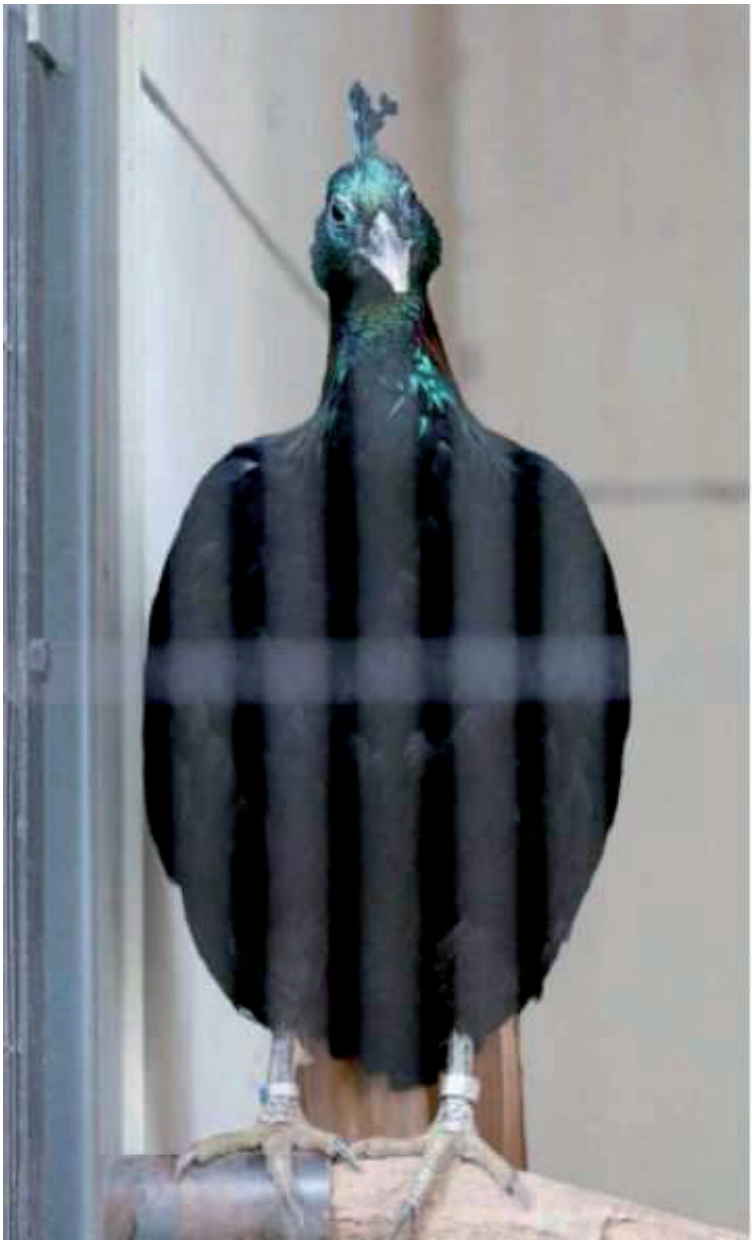


Lady Amherst's Pheasant

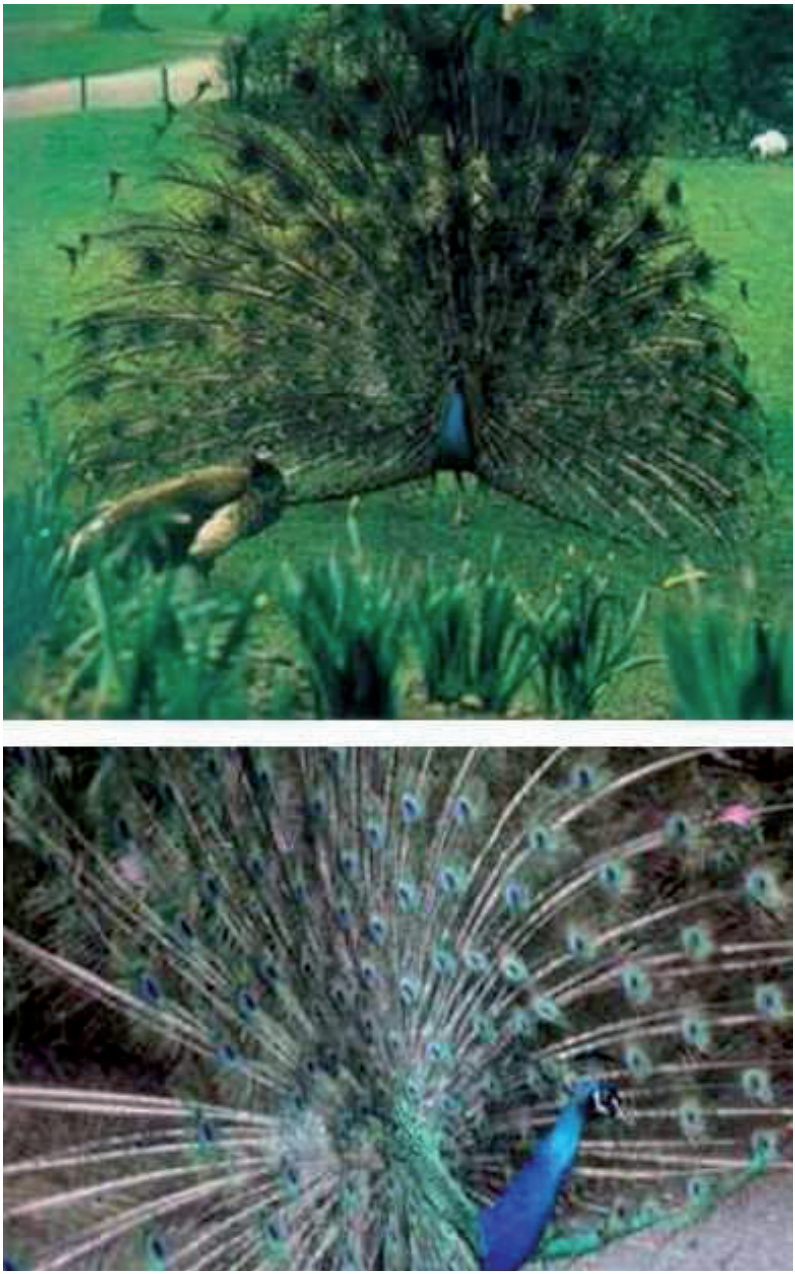
Pheasant satyr tragopan

Pheasant satyr tragopan

Himalayan monal pheasant

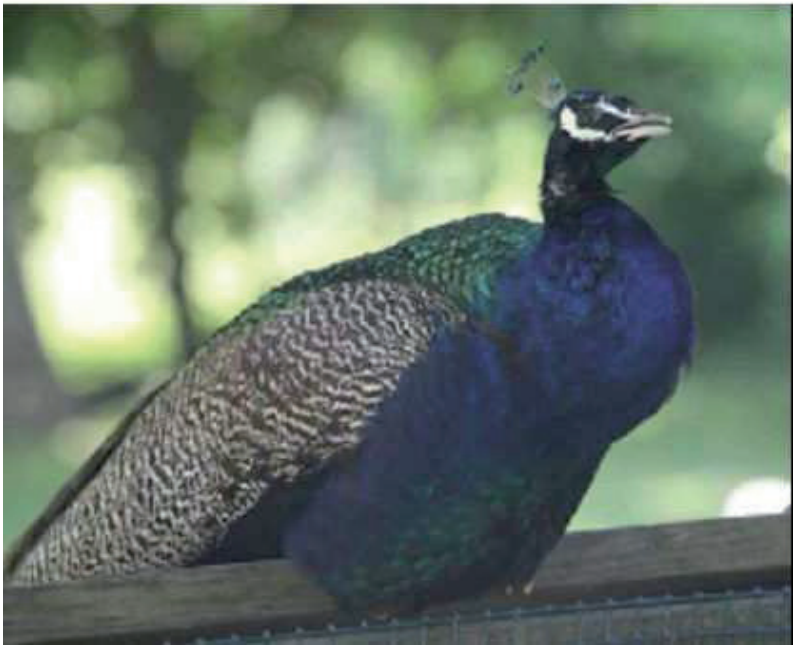


Himalayan monal pheasant



Blue peacock

Blue peacock



Blue peacock

W. peacock

Yokohama Chicken

Chicken

Domestic Chicken

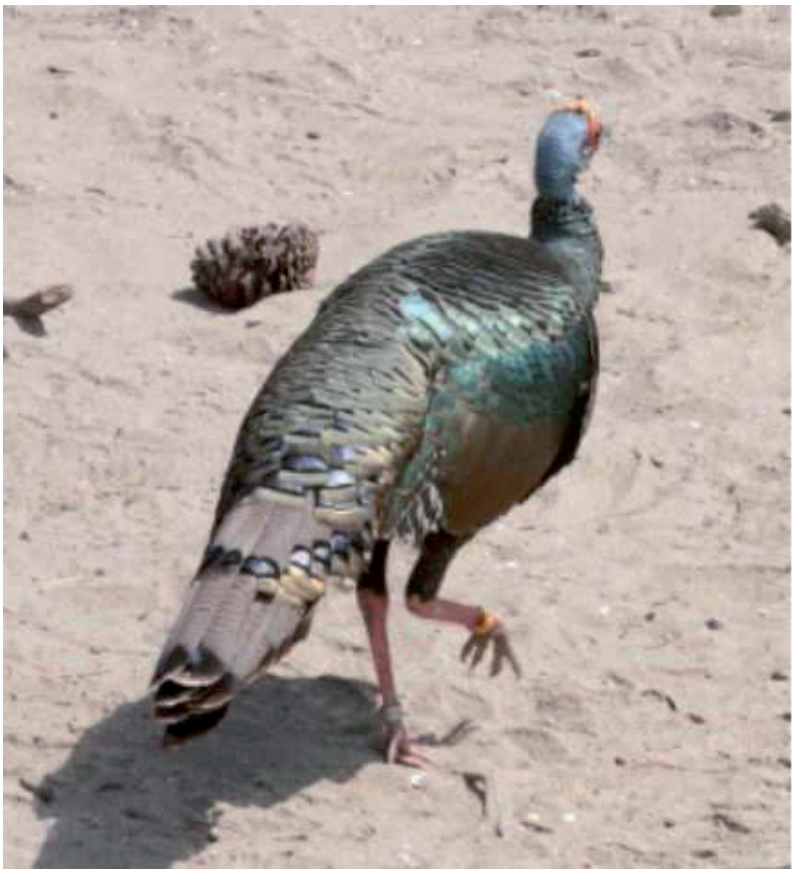
Chicken Domestic

Domestic Chicken

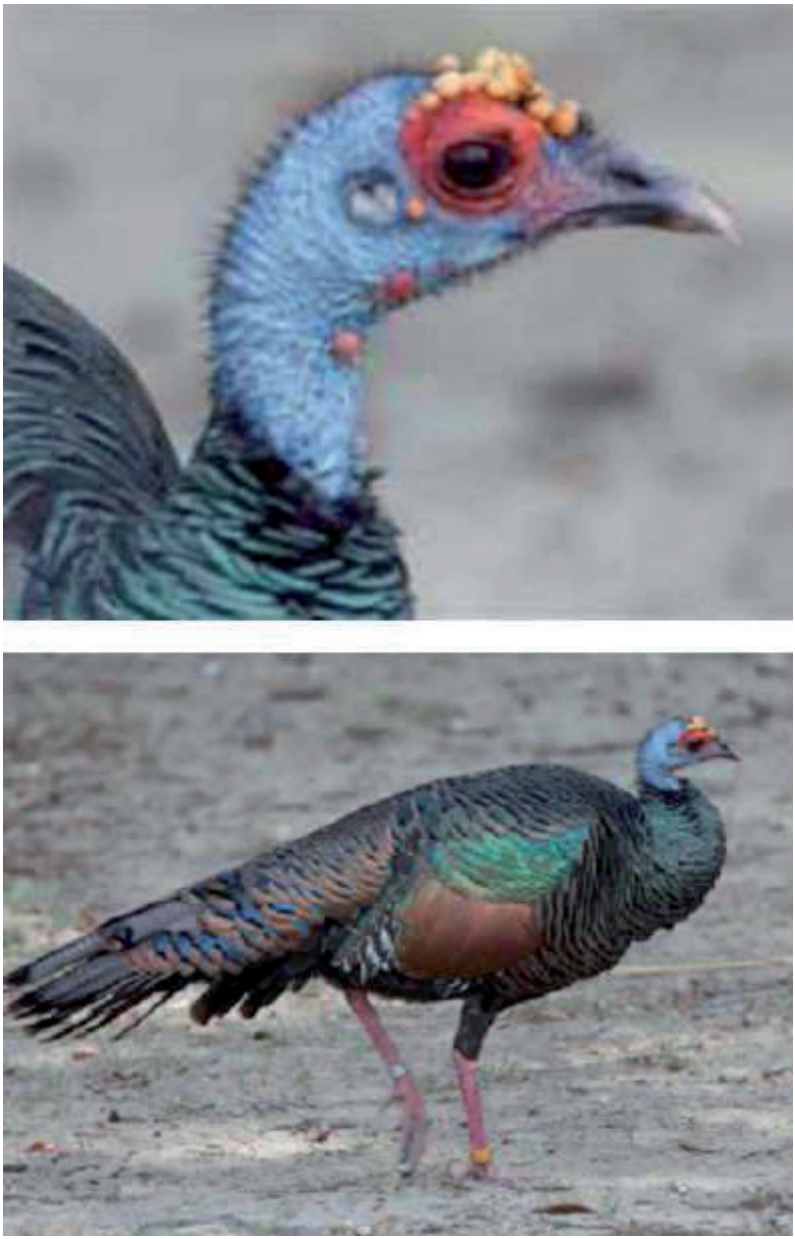
Kind of Domestic Chicken

E :Numidae

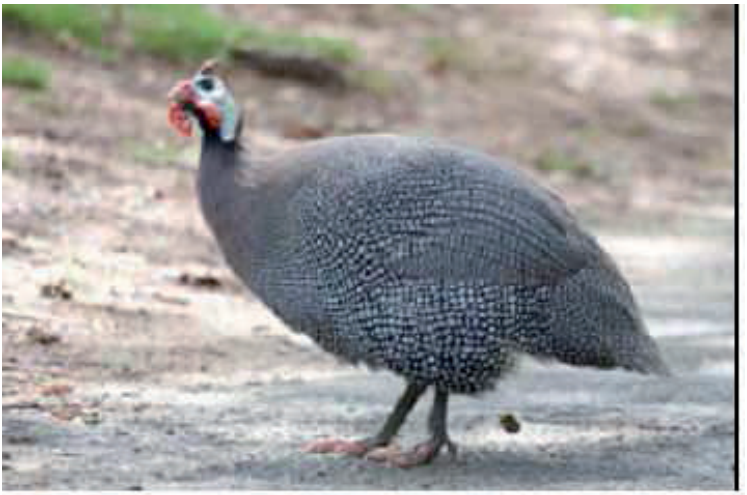
Meleagris Ocellata.

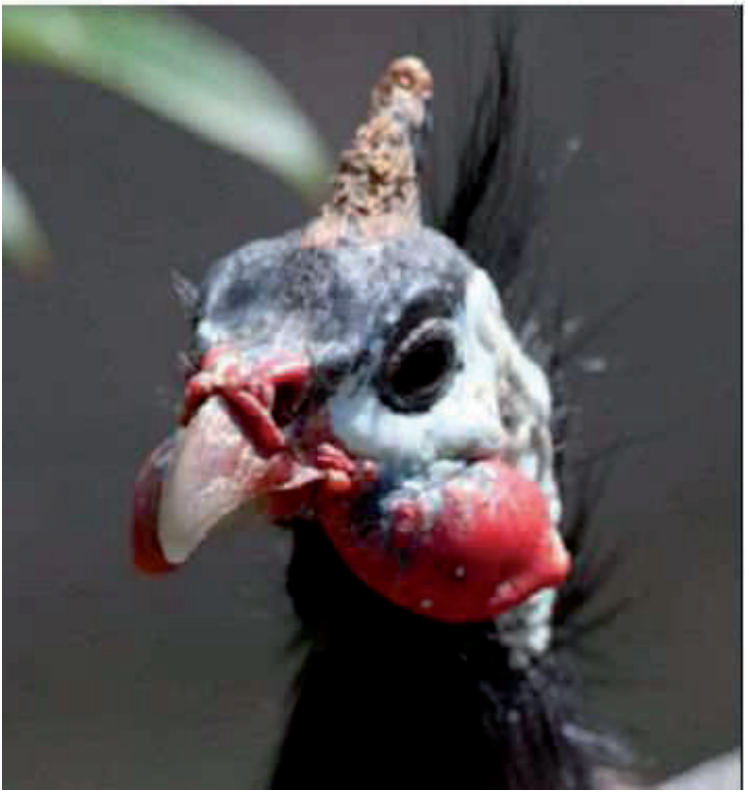


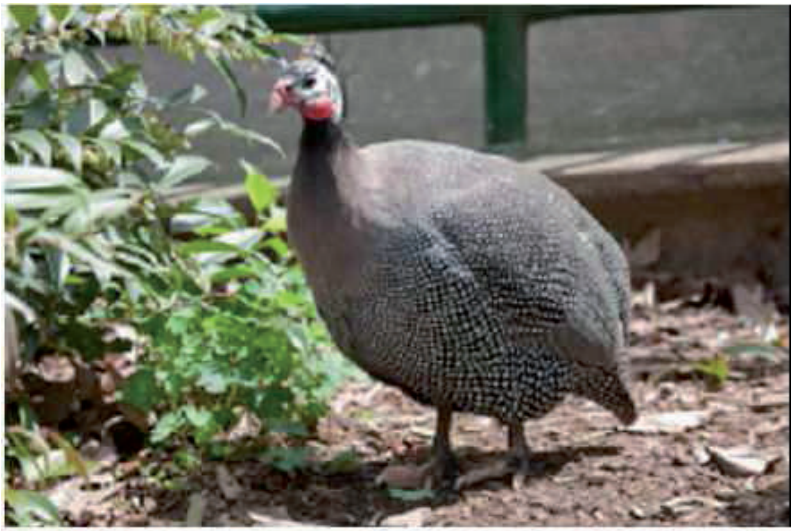
Meleagris Ocellata.

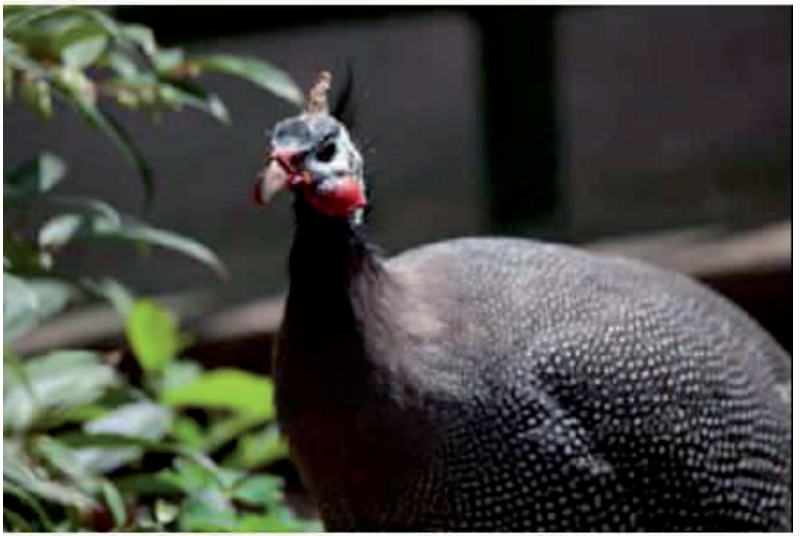


Meleagris Ocellata.



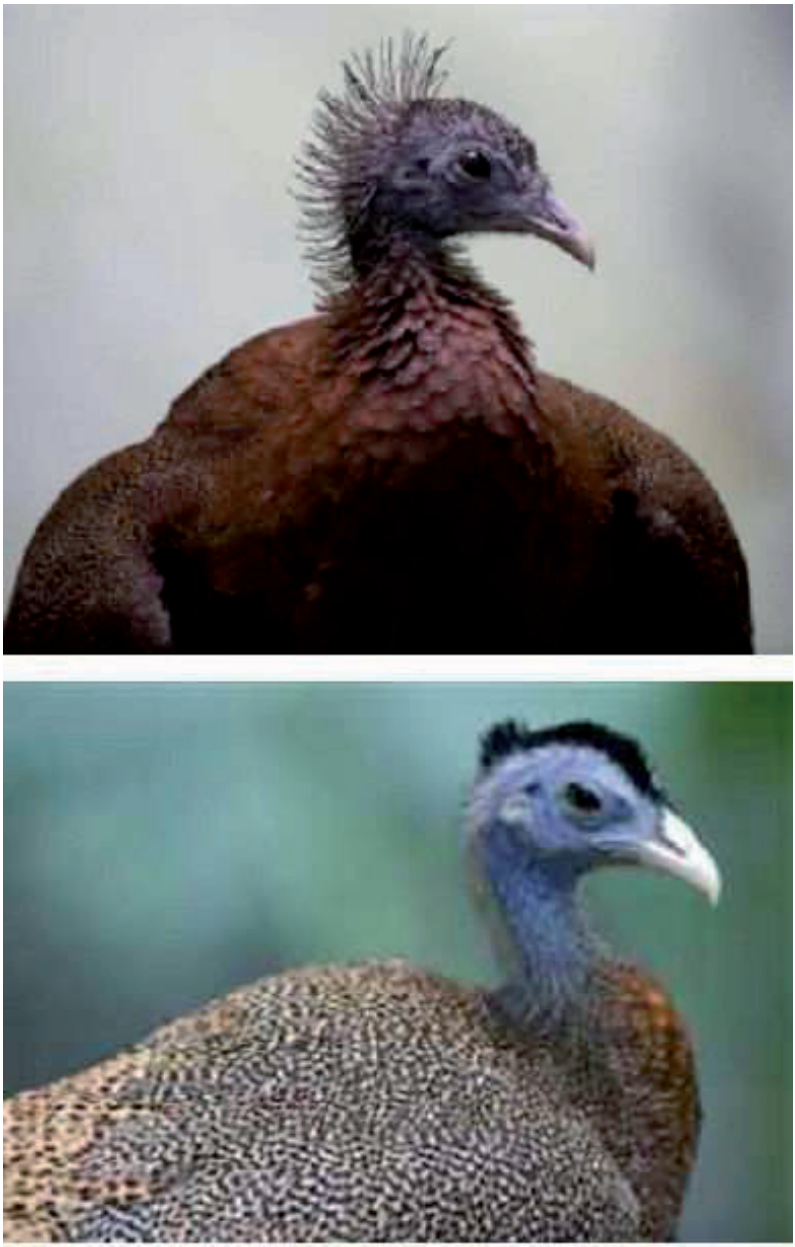






Guinea fowl

Crested Tinamou

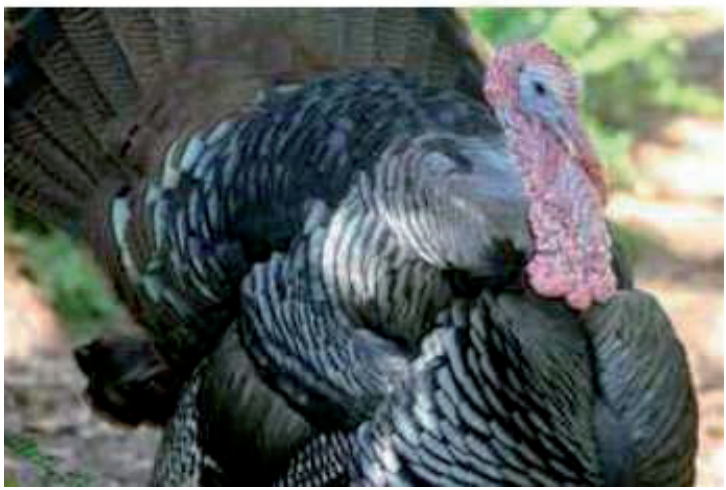


Great Argus

Great Argus

Great Argus.

F :Meleagrididae

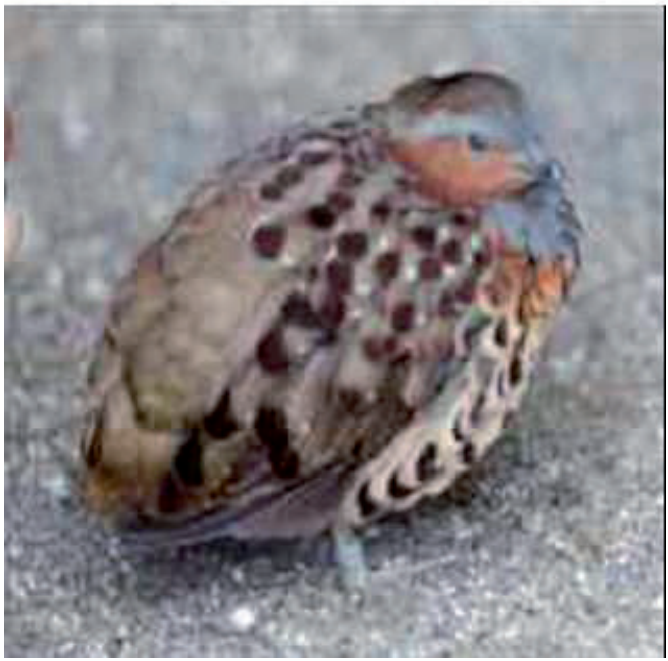


Wild Turkey

G : Opisthocomidae

Hawazen

H : Partridge



Crested Wood Partridge

Chinese Bamboo Partridge