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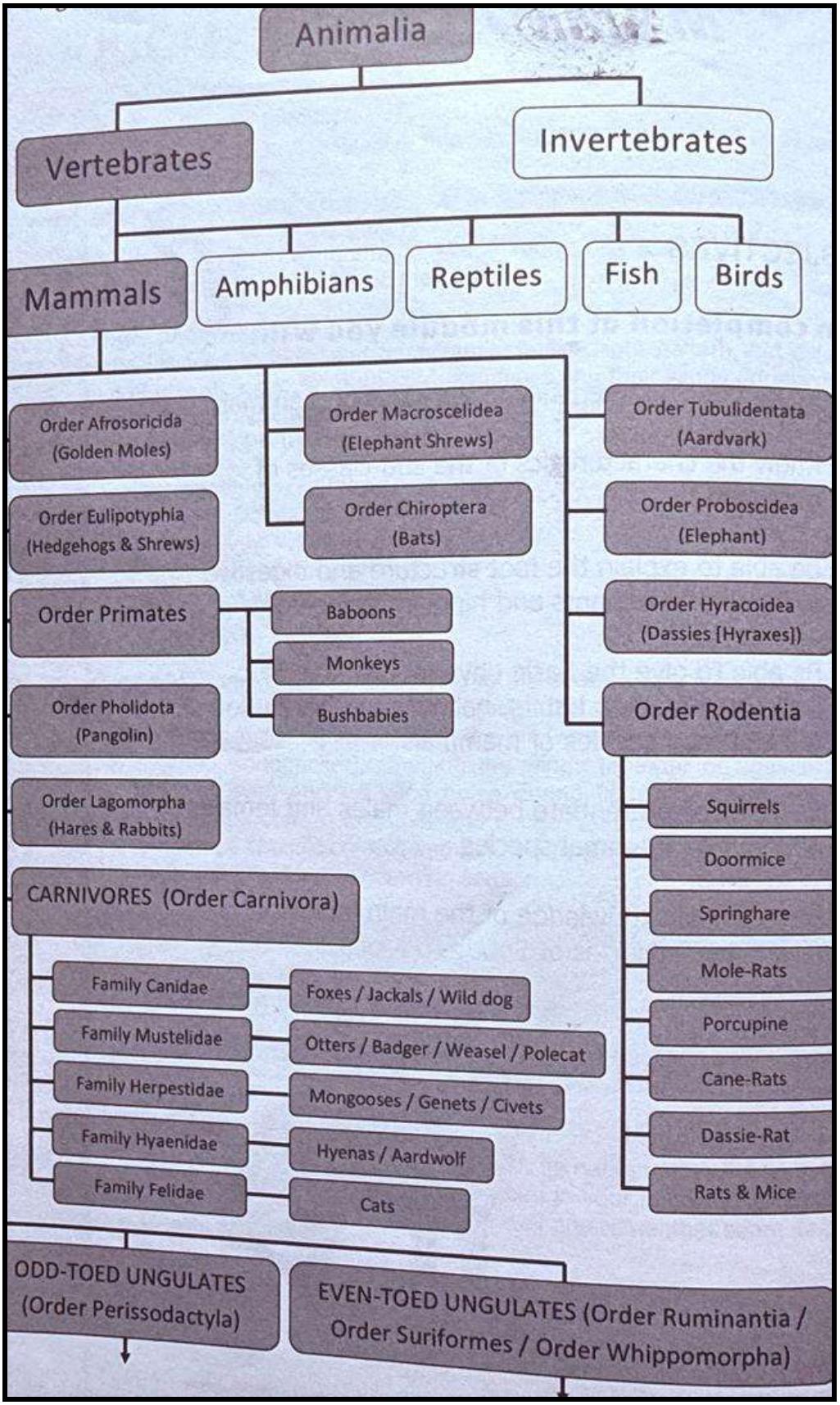
MODULE 14

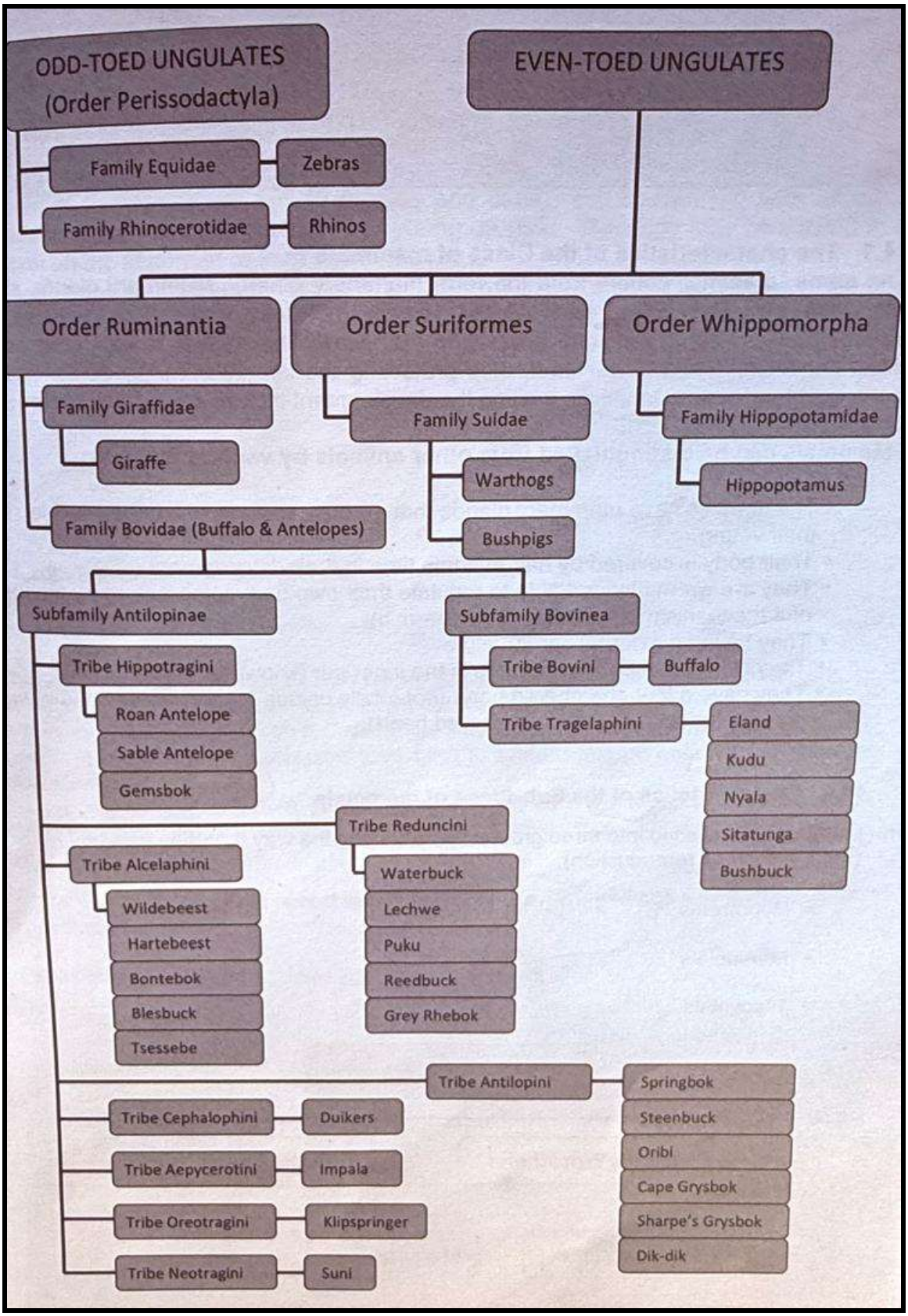
THE MAMMAL SPECIES

OBJECTIVES (14.1)

-
  - On completion of this Module you will:
    - Know the characteristics of the class Mammals.
    - Know the characteristics of the sub-order of Mammals.
    - Be able to give the basic physical characteristics, social and feeding habits, habitat and distribution of the common species of mammals.
    - Be able to differentiate between males and females of common mammal species (sexual dimorphism).
    - Have a basic knowledge of the main indicator ("flagship") species of Southern Africa.

- Simplified Classification Of Mammals (Excluding Marin Mammals) – (14.1.1). See diagram below:




ODD-TOED UNGULATES
(Order Perissodactyla)
EVEN-TOED UNGULATES
Family Equidae
Zebras
Family Rhinocerotidae
Rhinos
Order Ruminantia
Order Suriformes
Order Whippomorpha
Family Giraffidae
Giraffe
Family Suidae
Warthogs
Bushpigs
Family Hippopotamidae
Hippopotamus
Family Bovidae (Buffalo & Antelopes)
Subfamily Antilopinae
Subfamily Bovinea
Tribe Hippotragini
Roan Antelope
Sable Antelope
Gemsbok
Tribe Bovini
Buffalo
Tribe Tragelaphini
Eland
Kudu
Nyala
Sitatunga
Bushbuck
Tribe Reduncini
Waterbuck
Lechwe
Puku
Reedbuck
Grey Rhebok
Tribe Alcelaphini
Wildebeest
Hartebeest
Bontebok
Blesbuck
Tsessebe
Tribe Antilopini
Springbok
Steenbuck
Oribi
Cape Grysbok
Sharpe's Grysbok
Dik-dik
Tribe Cephalophini
Duikers
Tribe Aepycerotini
Impala
Tribe Oreotragini
Klipspringer
Tribe Neotragini
Suni

The Characteristics Of The Class Of Mammals (14.1.2).

- Mammals are basically vertebrates, which are warm blooded, four footed, covered in hair for insulation and air breathing. The name "Mammal" comes from the term **Mammary Gland.** Mammary glands are glandular milk-secreting organs of the female (not fully developed in males rudimentary). This is a unique adaptation that allows the mother to look after and feed babies for a longer time, thus protecting the infants from the demands of having to look after themselves making the development into an adult much easier.
- Physical Features Of Mammals; – Mammals can be distinguished from other animals by various features:
  - The females have mammary glands that produce milk which they suckle their young.
  - Their body is covered by hair at some time in their development.
  - They are warm blooded able to regulate their own body temperature by means of a mechanism in the brain (**endothermi**c), temperature regulation.
  - They have external ear structure.
  - They have three bone structures in the inner ear (**malleus, incus & stapes**), known as **Ear Ossicles**.
  - They have a four chambered heart (not totally unique to mammals as the crocodile also has a four chambered heart. These features are among the most to distinguish mammals from other animals.

➢ Characteristics Of The Sub-Class Of Mammals:

- Mammals are divided into three groups depending on the way that they reproduce (their pattern of reproduction).
  a) **Monotremes (Protheria)**
  b) **Marsupials (Metatheria)**
  c) **Placentals (Eutheria)**

- **Monotremes** – Order Monotremata: Monotremes are egg-laying (**oviparous**) mammals. These are the most primitive of the living mammals. In monotremes there is no gestation and the developing embryo draws on nutrients stored in the egg; much like in reptiles and birds. But in common with all other mammals, the monotremes rear their young on milk. The eggs may be carried in a pouch on the abdomen or kept warm in a nest. There are no monotremes found in Southern Africa; most are found in Australia. Examples of monotremes:
  1. Duck-billed Platypus.
  2. Spiny Anteater.

- **Marsupials** – Order Marsupialia: pouched mammals with a prolonged lactation period. These mammals are characterized by an abdorminal pouch called the **marsupiam,** in which they rear their young. Marsupials have a very primitive type of placenta called a **yolk-sack placenta**, in which the young are nourished for a short time. The gestation period is brief, and all marsupials give birth to undeveloped tiny young that are effectively still embryos. The young marsupials crawls into a pouch (the marsupiam), where they complete their development. They attach themselves to a mammary gland nipple and are nourished by milk. There are no marsupials found in Southern Africa; they all occur in Australia and New Zealand. Examples of marsupials:
  1. Kangaroos
  2. Opossums
  3. Koalas
  4. Tasmanian Wolves
  5. Wombats
  6. Bandicoots

7. Numbats

NB// Lactation: The period during which milk is produced by the mammary glands.
Embryo: An animal or human before it is born & when it is beginning to develop and grow.

- **Placentals –** are viviparous mammals with a prolonged gestation. These mammals have developed an advanced placenta, which is an organ of exchange enabling the young to remain within the body of the mother until embryonic development is complete. The gestation period is longer in placentals than marsupials. All the mammals naturally occurring in Southern Africa are placentals. The remaining 19 of the 21 orders of mammals are placentals (Eutherians). Example of placentals are:
  1. Impala
  2. Leopard
  3. Elephant
  4. Wild Dogs
  5. Warthogs etc.

  NB// Eutherian: A mammal whose young develops within a womb that is surrounded by a **placenta** (a vascular organ that develops inside the uterus of most pregnant mammals to supply food and oxygen to the foetus through the umbilical cord; it is expelled after birth).
  Viviparous: An animal that bears live young, and does not carry or lay eggs.

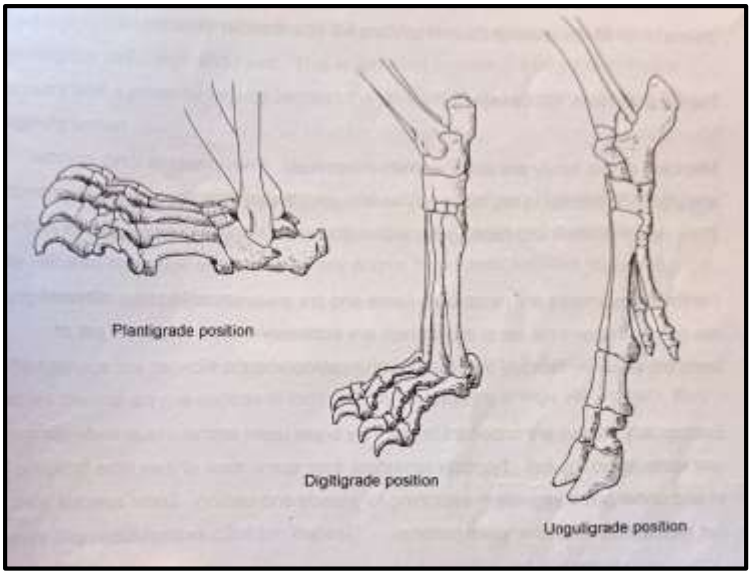
Mammal Foot Structures (14.1.3)

- Animals not only have different ways they walk in terms of gait; where the feet are placed and in what order they are moved, but also how the body is supported by the feet. This refers to the part of the foot that is in contact with the ground and therefore bears all the weight.
- All mammals can be divided into three different groups based on their foot posture while standing:
  1. **Plantigrade**
  2. **Digitigrade**
  3. **Unguligrade**

- Plantigrade Position: This foot position, the most primitive is used to describe standing or walking on the whole length of the foot. This method is used by man, apes, monkeys, bears and insectivores.

- Digitigrade Position: This foot posture is slightly more advanced mode, one in which the position of the heel and instep are raised in order that only the digits touch the ground. This position is adopted by predatory animals (members of the dog and cat families), enabling them to move silently.

- Unguligrade Mode: In ungulates this process has been advanced further and is an adaptation to running. This position allows these mammals to stand right on the tips of their toes that have greatly enlarged nails or hooves. See pictures below:



- Numbers of Digits (Toes).

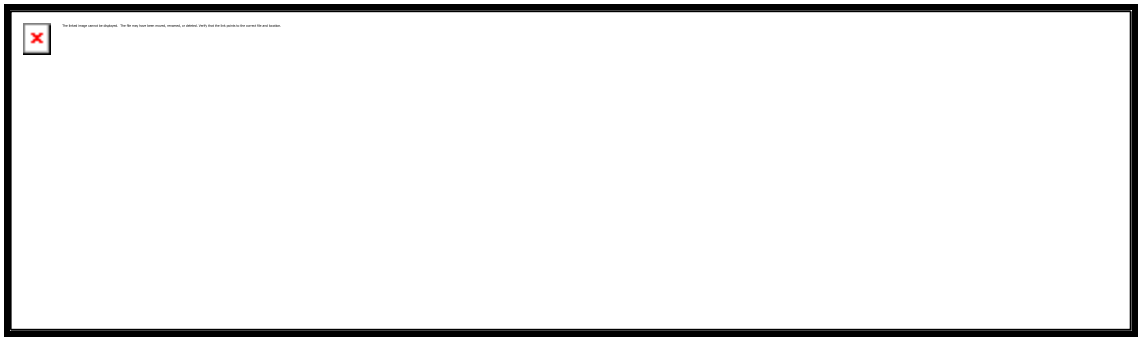
  - Plantigrade and Digitigrade mammals normally possess four or five digits. A pendactyl foot is one that has five digits on each foot as in the elephant. This primitive form led to the evolution of two groups of ungulates, namely **odd-toed** ungulates and **even-toed** ungulates. The digits (toes) of ungulates have over evolutionary time been reduced to three, two and even one digit.

NB// Ungulate – an animal that has hooves.
Pentactyl – a foot that has five digits on each foot or a hand that has five fingers.

- The True Ungulates – true ungulates are hoofed mammals that walk on tiptoe. They are classified into different orders depending on whether they have an odd or even number of toes.
  a) Odd-toed Hoofed Ungulates Mammals:
     – Order Parissodactyla – they have either a single toe, as in the zebra, or three toes together with a large middle toe as in rhino. Picture below:



  b) Even-toed Hoofed Ungulates Mammals:
     – There are three mammal orders with hooves having either two or four on each foot.
  c) Order Ruminantia (two toes on each foot)
     – Antelope, Buffalo and Giraffe
  d) Order Surriformis (two toes on each foot)
     – Warthogs and Bush pigs
  e) Order Whippomorpha (four toes on each foot)
     – Hippo (Pictures below):



f) Near-Ungulates:
   – The term near-ungulates refers to the fact that these mammals have toenails rather than proper hooves. Examples of near-ungulates: Elephants and Hyrax (Dassies). See pictures below:

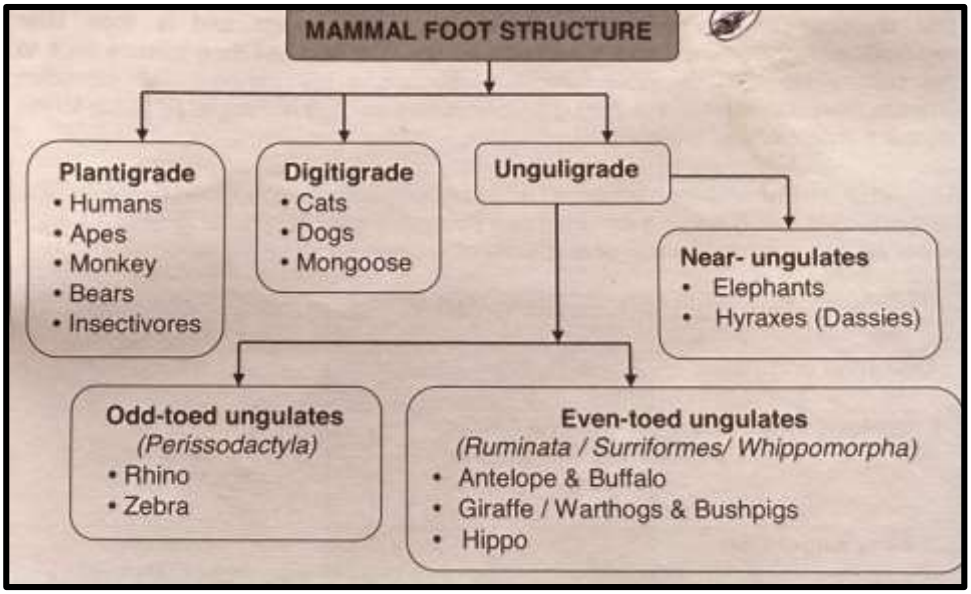


- Summary of mammal herbivore classification:

UNGULATES	**RUMINANTS**	**HIND-GUT FERMENTERS**
Odd-toed ungulates	All Antelope	Rhino
Even-toed ungulates	Buffalo	Hippo, Bush-pig, Warthog
Near-ungulates	Giraffe	Elephant, Hyrax (Dassie)

- Characteristics of near-ungulates:
  - They walk on the whole foot (plantigrade).
  - They have toenails rather than real hooves.
  - They have teats between the forelegs (pectoral mammae).
  - They have the same type of placenta and womb.
  - The upper incisors are reduced in number and modified as tusks.
  - The molars have transverse ridges.

- Summary Of Mammal Foot Structure Classification. See diagram below:

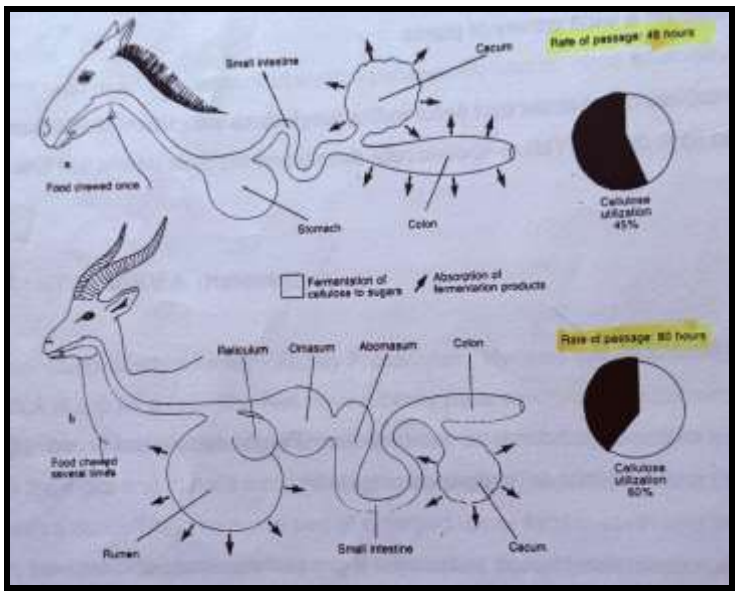


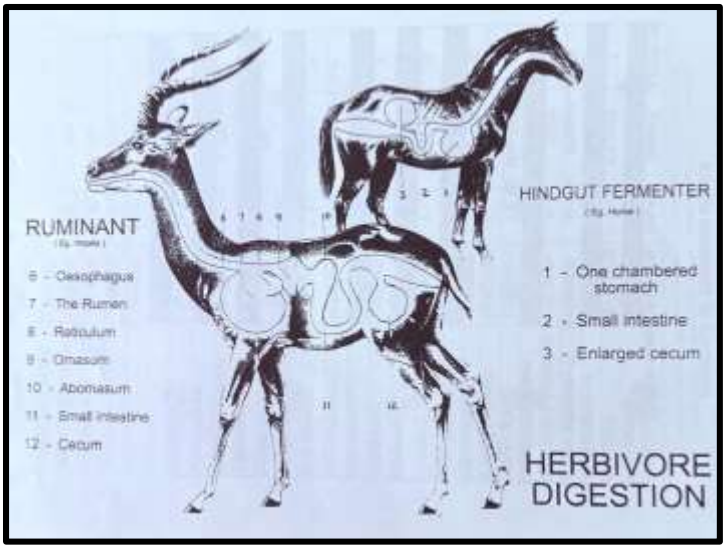
Mammal Digestive Systems (14.1.4)

- The ungulate and near-ungulate mammals can further be classified according to their digestive systems; the way they process the food they eat. Most ungulates eat large amounts of relatively indigestible cellulose. Before this cellulose can be fully digested it needs to go through a process of bacterial fermentation. Herbivores have developed two different digestive systems to deal with this. They are:
  a) Hind-gut Fermentation.
  b) Rumination.

NB// Cellulose – a substance that forms the outer layer (walls) of plant cells and plant fibers.
Rumination – to regurgitate partially digested food and chew again.
Fermentation – the breakdown of carbohydrates by micro-organisms.

- **Ruminant Digestion/hind-gut fermentation.** See diagrams below:





- Ruminants are mammals that are able to acquire nutrients from plant-based food by fermenting it in a **specialized stomach** prior to digestion, principally through bacterial actions. The process typically requires regurgitation of fermented ingesta (known as **cud**); and chewing it again. The process of re-chewing the cud to further break down plant matter and stimulate digestion is called **rumination**, originating from the Latin word "ruminare", meaning to chew again. There are about 150 species of ruminants, which include both domestic and wild species. Ruminating mammals include both domestic and wild species; cattle, goats, sheep, antelope, dear, giraffe and llamas.
- The primary difference between a ruminant and a non-ruminant is that ruminants have a four-compartment stomach. The four parts of the stomach (in order) are the **rumen, reticulum, omasum** and **abomasum.** In the first two chambers, rumen and the reticulum, the food is mixed with saliva and separates into layers of solid and liquid material. Solids clump together to form the **cud** or **bolus** that is regurgitated for re-chewing to make the particles smaller. Effectively increasing the surface area available for bacterial fermentation, thus improving digestive efficiency. Fiber, especially cellulose is primarily broken down in these first two chambers by microbes (mostly bacteria, as well as some protozoa, fungi and yeast) into volatile fatty acids while proteins and carbohydrates (sugar and starch) are also fermented.
- Even though the rumen and reticulum have different names, they represent the same functional space as digesta can move back and forth between them. Together these chambers are called **reticulorumen.** The degraded digesta, which is now in the lower liquid part of the reticulorumen, then passes into the next chamber the omasum, where water and many of the inorganic mineral elements are absorbed into the blood stream.
- After this, the digesta is moved to the true stomach, **abomasum** which is the direct equivalent of the monogastric/single stomach found in most other animals where food is digested in much the same way. Digesta is finally moved into the small intestine, where the digestion of nutrients occurs. Microbes produced in the reticulorumen are also digested in the small. Fermentation continues in the large intestine in the way as in the reticulorumen.

- Advantages of rumination include:

  - Get up to 75% of nutrients from food (as opposed to 30% in monogastric).
  - Spend less time resting means more alert; lowers mortality.
  - Less moisture required and more extracted; a water saving mechanism.
  - Gut bacteria become a protein source when they pass through digestive tract with the stomach contents. In addition, their waste products, in the form of volatile fatty acids, provide their host with energy.
  - They are able to recycle urea, reducing urination. This vital water conservation strategy allows ruminants to colonize arid areas.

- Gut bacteria use the nitrogen in urea to synthesize more protein, which provides the host with essential amino-acids that would otherwise need to be derived directly from the food.

- Disadvantages include:

  - Protein content of food needs to exceed 60% for it to be viable.
  - Takes time.

- **Hind-gut Fermentation.**

  - Hind-gut fermentation is a digestive process seen in monogastric herbivores where fermentation and digestion occur in the intestinal area after the stomach – hence the name. Cellulose is digested with the aid of symbiotic bacteria in the large intestine and caecum. Examples of hind-gut fermenters include elephants, rhinos, zebras and hares. Hindgut fermenters generally have a caecum and large intestine that much larger and more complex than those of a foregut or mid-gut fermenters.
  - While foregut fermentation is generally considered more efficient, and monogastric animals cannot digest cellulose as efficiently as ruminants. Hindgut fermentation allows animals to consume small amounts of low-quality forage all day long and thus survive in conditions where ruminants might not be able to obtain nutrition adequate for their needs.
  - Hindgut fermenters are able to extract more nutrition out of small quantities of food. The large hindgut fermenters are bulk-feeders; they ingest large quantities of low-nutrient food, which they process more rapidly than would be possible for a similarly size foregut fermenter. The ability to process food more rapidly than foregut fermenters gives hindgut fermenters an advantage at very large body size; as they are able to accommodate significantly larger food intakes. The largest extant and prehistoric mega-herbivores have been hindgut fermenters. Study of the rates of evolution of larger maximum body mass in different terrestrial mammalian groups has shown that the fastest growth in body mass over time occurred in hindgut fermenters.
  - Hindgut fermenters are sub-divided into two groups based on the relative size of various digestive organs in relationship to the rest of the system; colonic fermenters tend to be larger species such as rhinos and caecal fermenters are smaller animals such as rabbits & rodents.
  - However, in spite of the terminology, colonic fermenters still make extensive use of the caecum to break down cellulose. Also colonic fermenters typically have a proportionally longer larger intestine than small intestine; whereas caecal fermenters have a considerably enlarged caecum compared to the rest of the digestive tract.

Diet – What Do Animals Eat? (14.1.4)

- **Ruminants** – animals with a four chambered stomach adapted to extract the maximum nutrients from vegetation; this includes: Antelopes, Giraffe and Buffalo. Most ruminants are selective grazers or mixed feeders.
- **Hindgut Fermenters** – Animals that can cope with eating larger quantities of less nutritious vegetation; this includes: Common Zebra, Hippo and White/Black Rhinos. All hindgut fermenters are bulk grazers.
- **Bulk Grazers** – animals that are not selective about which grass to eat. This group includes; common zebra, white rhino, hippo, buffalo, sable antelope and waterbuck.
- **Selective Grazers** – animals that only eat specific kinds of grass or vegetation. This group includes; blue wildebeest, blesbok, common reedbuck, gemsbok mountain reedbuck, red hartebeest, springbok, tsessebe and warthog.
- **Mixed Feeders** – Animals that may graze or browse, or eat fruit bulbs, forbs etc. This group includes; bushbuck, duiker eland, elephant, impala, klipspringer, nyala and steenbok.

- **Browsers** – animals that eat mostly leaves. This group includes; giraffe, kudu and black rhino.
- **Frugivore** – animals that eat fruits, e.g. Angolan epauletted fruit-bat.
- **Omnivores** – animals that beat a mixed diet. This group includes; chacma baboon, civet, jackals and genets.
- **Piscevore** – animals that subsist mainly on fish; for example; spotted-necked otter.
- **Carnivores** – animals that eat meat. This group includes; hyenas, cheetah, lion, leopard and wild dog etc.

❖ Interestingly, the suffix "**vore"** derived from **vorare** (Latin) means to devour and is used to describe an animal by what it eats. Names are given to animals that have certain dietary preferences as follows:

- Detrivore ---- decomposing material.
- Folivore ---- leaves.
- Granivore ---- seeds.
- Herbivore ---- plants.
- Insectivore --- insects.
- Saprovore ---- dead matter.
- Mucivore ---- plant juice.
- Mycovore ---- fungi.
- Nectarivore --- nectar.
- Omnivore ----- plants & meat.
- Sanguinivore – blood.

❖ **Phagia** or **Phagy** is an ecological or behavioral term used to describe particular feeding behaviors, and generally used as a suffix as well. It derives from phagein Gr), meaning to eat. A few examples are as follows:

- Coprophagia ----- Feeding on faeces.
- Geophagia ----- Feeding soil.
- Hermatophagia --- Feeding on blood.
- Oplinophagia ----Feeding on snakes.
- Osteophagia ----Feeding on bone.
- Phytophagia ---- Eating of plants.
- Monophagia ----- Eating a single type of food.
- Polyphagia ----- Feeding on many types of food.
- Cerophagia ----- Feeding on keratin.

❖ Occasionally carnivores are seen to eat vegetation, but they lack the physiology to efficiently digest it. They appear therefore, to only eat this material as an emetic/purgative in a bid to **cleanse** the digestion system of parasites.

❖ Lagomorphs (hares and rabbits), among others, practice a behavior called **refection** (technically defined as a light meal). They immediately re-ingest soft, moist dung pallets that are produced during the day when resting (these are usually greenish in color, as mammals that do this are primarily vegetarian). These mammals are usually active at night and at this time produce drier and harder dung pellets; the resultant waste products of day-time refection. The softer pellets are called **night faeces (**from night feeding) or more correctly **cecotropes** (cecal pellets – produced by the caecum).

Characteristics Of Mammal Orders (14.1.5).

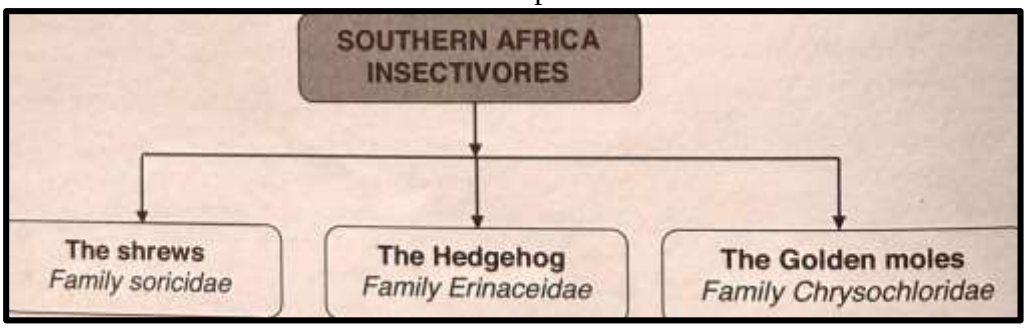
- This section provides a brief outline of the different orders of Southern African mammals. More detailed information should be studied using the references for a better understanding of the many species that are found within each order.

- **The Insect Eaters –** Order Eulipotyphla (was originally, Order – Insectivora). The insectivores are generally seen to be the most primitive of all living placental mammals. The insectivores are generally small animals with mobile, narrow snouts. Insectivores all have a plantigrade foot structure and most of them have short limbs (legs) with five digits on each foot. Their eyes are relatively small.

- The insectivores have the following primitive characteristics:

  - They have a small brain.
  - Not many wrinkles to increase the surface area.
  - They have primitive teeth.
  - Primitive characteristics of the auditory bones and collar bones.
  - They have a plantigrade gait.

- All insectivores in Southern Africa can be placed into one of three families. See diagram below:



1. The Shrews (Family Soricidae) – there are 15 species in Southern Africa. Members of this family:
   - Are small and secretive mammals.
   - They possess long pointed and narrow muzzles.
   - They have small eyes and their vision seems to be poor.
   - Their senses of smell and hearing are acute (exceptionally good).
   - Both male and female possess musk glands.
   - Shrews are born with their final set of teeth that are very sharp.
   - Their first set of teeth are shed or reabsorbed in the embryonic stage.
   - From an ecological point of view, shrews are extremely important in that they break down animal tissue and raw materials are in this way returned to the soil. Being terrestrial by nature they spend the majority of time in and under fallen vegetation in search for insects and carrion. Some shrews also eat nuts, seeds and other plant material.

2. Southern African Hedgehogs (Family Erinaceidae) – there is only one species of hedgehog in Southern Africa.
   - The hedgehog`s body plan is seen to be primitive with the exception of the spines and associated muscles.
   - Their ears and eyes are well developed.
   - The long snout has a mobile tip.
   - They have powerful legs and strong claws.
   - The hedgehog`s most distinctive feature is the spine which are modified hairs ending in a needle-sharp point. Each spine is constructed of many small chambers filled with air. At the base of each spine is a small muscle that has the function of pulling the spine erect when the hedgehog is threatened by any kind of danger. Hedgehogs also protect themselves by curling up into a ball, in this way protecting the belly, legs and head. The hedgehog is able to achieve this by having a larger skin than is actually necessary and a powerful muscle below the skin, that when contracted causes the hedgehog to curl up.
   - Hedgehogs feed on a large variety of prey and a certain amount of vegetation matter. They feed on earthworms, beetles, earwigs, slugs, millipedes and centipedes. They will also scavenge on the remains of dead animals, eggs and young chicks that they take from nests. Hedgehogs are able to undergo periods of hibernation (dormancy). This allows them to survive periods of low food availability by reducing their energy requirements to low levels.

3. The Golden Moles (Family Chrysochloridae) – There are 15 species of Golden Moles in Southern Africa:
   - The members of this insectivore family are solitary and they burrow.
   - The golden moles spend more time burrowing for food than any activity.
   - They have short limbs and have strong digging claws on their forelimbs.
   - They do not have any visible tail and their and their eyes are almost non-existent.
   - Their ear and eye openings are covered with fur and their nostrils are shielded by a leathery pad that that protects them from soil during their burrowing.
   - The golden moles are very sensitive to vibrations in the soil.
   - Most of the golden mole species dig burrow systems that are fairly elaborate with specific chambers. When sections of their burrow system have been destroyed or damaged, they are able to orientate themselves and construct new tunnels that link up with the existing ones. Golden moles feed mainly on earthworms, insects, larvae, slugs, crickets and spiders. Any prey that is captured above ground is usually dragged into the burrow and eaten there.

❖ The Elephant Shrews (Order Macrosceliea) – This order only consists of one family – Macroscelididae; and there are 7 species of elephant shrews and they only occur in Africa.
- Elephant shrews, although widely spread throughout Africa, are not seen very often due to their secretive behavior.
- They are purely terrestrial mammals and have long legs.
- Their hind legs are much longer than the front legs, and are adapted to jumping.
- They have large eyes.
- They possess long rat-like tails.
- Some elephant shrews clear and maintain complex trail networks which they actively defend. These trails enable them to **traverse (**travel through or across) their territories easily and quickly. Each day the individuals of a pair separately traverse most of their trail network, to remove twigs and leaves that have fallen during the night. They do this with swift side-striking movements of their front feet. These trails enable the elephant shrews to make full advantage of their running abilities when trying to escape potential predators.

❖ Hares and Rabbits (Order Lagomorpha) – This order is represented by only one family in Southern Africa – Leporidae and are seven species:
- Scrub Hare - Smith`s Red Rock Rabbit.
- Cape Hare - Hewitt`s Red Rock Rabbit.
- Riverine Rabbit - Jameson`s Red Rock Rabbit.
- Natal Red Rock Rabbit.

- The lagomorphs were originally classified as rodents, due to their gnawing incisors; but they have a second pair of small peg-like incisors behind the constantly growing pair in the top jaw, unlike rodents.
- The long hind legs are adapted for running.
- Their ears are very large and mobile.
- The large eyes are adapted to conditions of low light.
- The fur is normally long and soft and their feet are completely covered in fur.
- Their nostrils can be opened and closed by a fold above.
- The herbivorous lagomorphs have a highly modified digestive system that is able to cope with large quantities of vegetation. The caecum situated between the large and small intestines contains bacterial flora that aids in the digestion of cellulose. Other vitamins such as B12 would usually be lost if it were for the fact that lagomorphs re-digest (eat) some of their faeces and pass them through their stomach twice (known as coprophagy – when an animal eats dung).

❖ The Rodents (Order Rodentia).

- This is a very diverse group of mammals consisting of 92 species divided into two sub-orders:

a. Sub-order Histricognathi – Porcupines, Cane-rats, Mole-rats and the Dassie-rat. The cape Porcupine is the largest rodent in Southern Africa.
b. Sub-order Scuirognathi – Dormice, Squirrels, Spring Hare, Rats & Mice.

- It is believed that rodents are without a doubt the most successful order of all living mammals. They are the most numerous in terms of species with over 1650 being described world-wide. Rodents are found in almost every habitat and have well developed reproductive abilities.

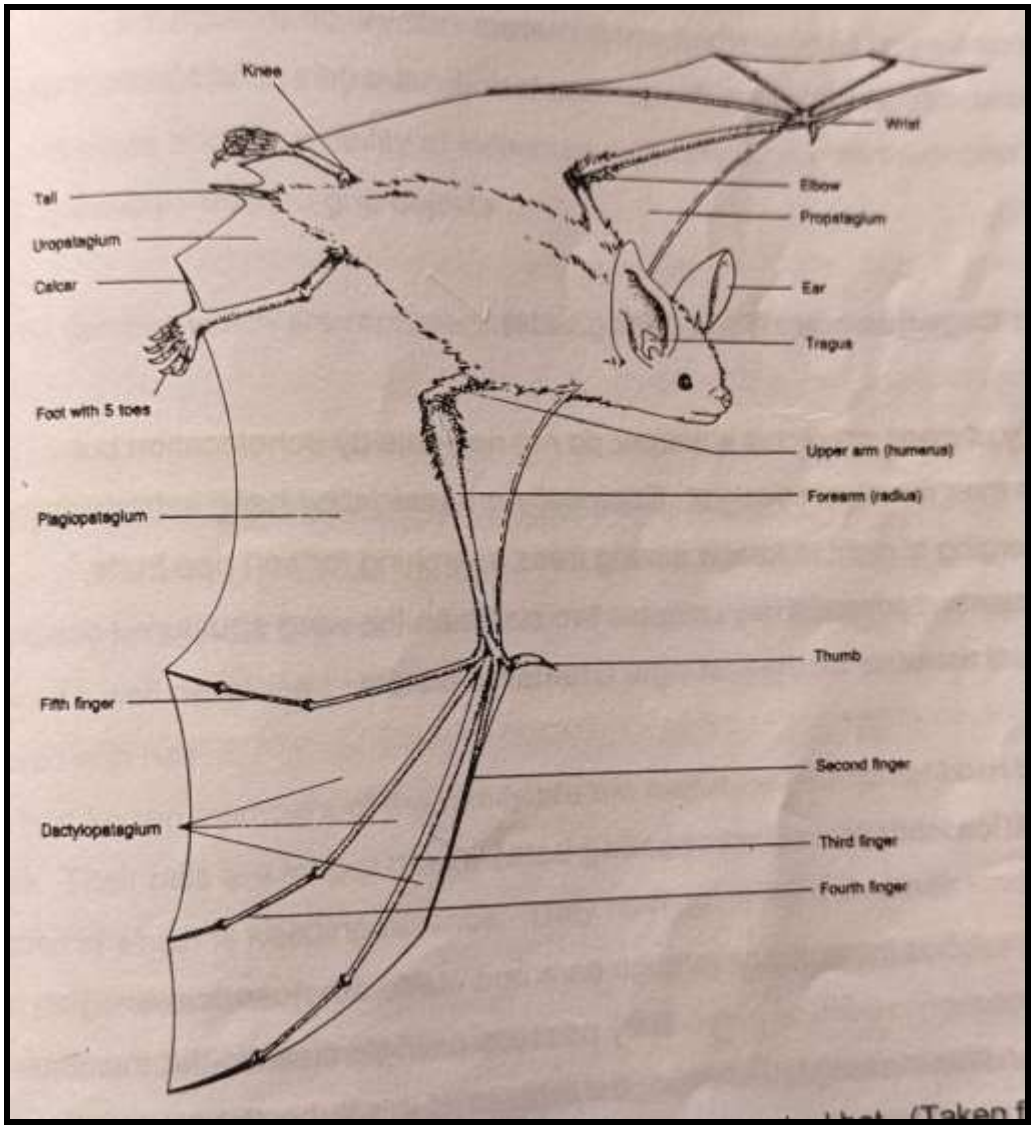
❖ Characteristics of rodents:

- Most rodents are small and have short limbs and a tail.
- They have a single pair of razor-sharp incisors that grow continuously throughout their lifetime as they are being worn down constantly.
- Rodents do not have canine teeth.
- Some species possess check pouches that are skin folds lined with fur. These check pouches allow the rodent to build up large stores of food.
- The rodent`s sense of smell and hearing are well developed.
- Rodents` whiskers are long and touch-sensitive (vibrissae – organs of touch).
- Most species of rodents eat a wide range of plant products, from leaves to fruits. Rodents have a relatively large caecum that contains bacterial flora that function to separate cellulose into carbohydrates that are easily digestible. It is however only in the stomach that is higher up, where absorption can take place. In order to overcome this, the rodent re-eats the bacterially treated food by taking pellets directly from its anus. On the second round through the stomach, carbohydrates are absorbed.

❖ The Hyraxes (Dassies) – Order Hyracoidae – The order comprises only one family; the family Procaviidae. There are three species that occur in Southern Africa:

- The Rock Dassie, The Tree Dassie & The Yellow-Spotted Rock Dassie.
- Characteristics of Hyraxes:
- Hyraxes are small, solidly built mammals with a stump for a tail.
- Their feet have rubbery pads that contain a number of sweat glands.
- There are four digits on the front feet and three digits on the hind foot.
- All the digits end with nails except for the inner digit of the hind foot that is armed with a claw.
- Hyraxes have one pair of upper incisors that are enlarged and two pairs of lower incisors. There are no other front teeth.
- Hyraxes have kept certain features that are primitive, namely biting with their molars instead of their incisors (an inefficient method of cropping). They also have a poor regulation of body temperature and possess short feet. Hyraxes do have efficient kidneys that enable them to function on a bare minimum of moisture intake. They also have the capacity for concentrating urea and excreting large quantities of un-dissolved calcium and crystallized calcium carbonate forms deposits that whiten the rocks.
- They have a poor ability for body temperature regulation. The loss of body heat is prevented by the behavior of huddling together, long periods of inactivity and basking in the sun. They feed on a wide range of plant matter.

❖ The Bats (Order Chiroptera) – world-wide bats (Chiroptera means “hand-wing”), can be divided into three groups based on their diet. Only two sub-orders occur in Southern Africa based upon their dietary habits and resulting differences in their anatomy; the **Fruit eating bats - Megechiroptera** (Family Pteropodidae) and the **Insect eating bats - Microchiroptera** (Family Rhinolophidae). The third group that do not occur in Africa are the blood-drinking bats. Of all the mammalian species, the bats make up nearly one quarter. Bats are the only mammals that are capable of sustained flight. The other mammals that fly only glide and they do not flap their wings. See diagram illustration of the body plan of a typical bat below:



- The wings of bats are membranes that are made up of skin, elastic tissue and muscle fiber. The wings extend from the shoulder to the foot and enclose the tips of the digits and partially or totally enclose the tail vertebrae. The legs, arms and fingers all attached to the membranes (wings) that provide them with support. When the bat is at rest, the wings, legs, arms and the fingers fold up alongside the body. Any holes in the wings will usually heal up within a few weeks and broken finger bones mend quite quickly.
- The legs that support part of the membrane are generally quite weak. They project sideways and the knee bends back rather than forward as with other mammals. Bats hang upside down when they are at rest with the hind limbs acting as a hook. Bats possess a mechanism that locks the digits of their hind feet in place, thus preventing them from falling. Some bats have well developed sight and their senses of hearing and smell are also very good.
- All bats have incisors and canines as well as premolars & molars. The difference in dentition between the fruit-eating bats and the insectivorous bats is that the crowns of the molars are flattened in fruit-eating bats, while the insect eating bats have molars with sharp crests.
- All bats have a clawed thumb attached to the wing membrane that is generally used for moving around roosts, but some species use it to manipulate and hold food as well as to fight. Bats tails are very variable with some lacking tails, while others possess long thin tails similar to mice. The correlation of the wing membrane to the tail vertebrae is an important aspect to look at when distinguishing bat families.
- Some species have large ears and nose leaves. The skin area is proportional to the volume of the body. Due to this, a large amount of body heat is lost (wing membrane, ears, nose

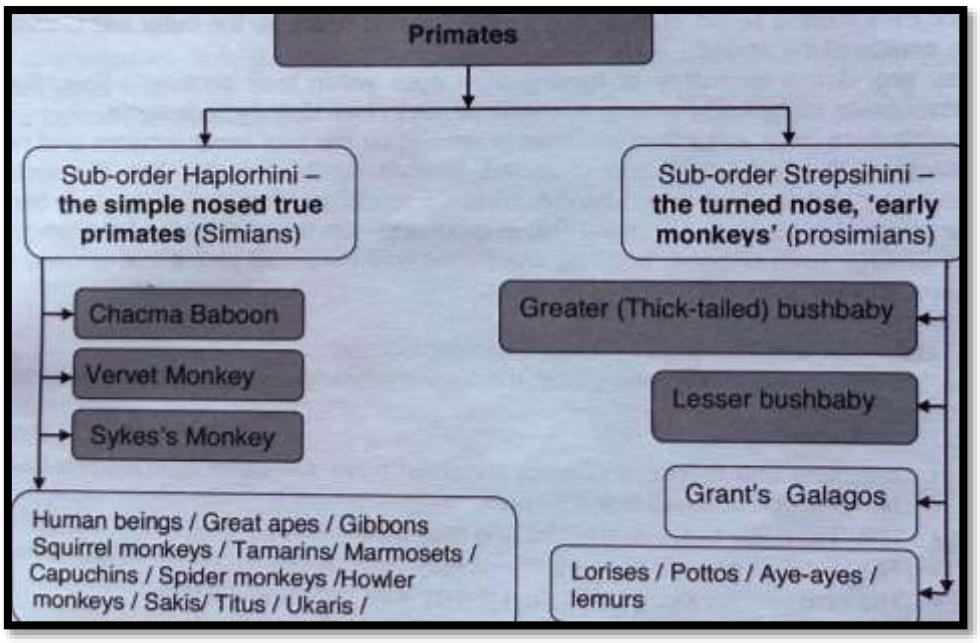
leaves). This is compensated by the intense feeding, sleeping in clusters and in some bats by hibernating.

- Fruit-eating Bats (Sub-order – Megachiroptera).
  - All members are fruit eaters, although flowers, buds and nectar also provide nourishment to some species. Fruit bats tend to hover and pick smaller ripe fruit that they carry in their mouths to a nearby feeding sight to consume. Fruit bats play an important role in maintaining woodland savannas and forests areas. Some trees rely solely on fruit bats for pollination, whereas many trees rely on them to disperse their seeds (Sausage tree Kigelia Africana). Large quantities of fruit have to be consumed to obtain sufficient protein to meet the body`s protein demand. Meals are digested remarkably fast, often in less than an hour and can be excreted in flight. In this way the undigested seeds are dispersed.
  - Fruit eating bats are generally larger than insectivorous bats. All fruit bats have elongated muzzles and tubular pointed ears, giving them a foxlike appearance. They have two claws on each wing, one on the end of the thumb and the other on the index finger, which help them to clamber in trees and handle food. They all have large eyes on which they rely to navigate at night. Fruit bats do not as a rule possess the ability to echolocate. Females give birth to one pup per season in summer. The mother often carries the young on her nightly excursions. The baby attaches itself to its mother by clinging to a nipple with its mouth and clutches onto the fur with its hind feet.
- Insect-eating bats (sub-order Microchiroptera).

  - Insectivorous bats are generally far smaller than fruit-eating bats. These bats have evolved a remarkably sophisticated and accurate navigation system known as echolocation. They will also use their eyes to see while in flight. By means of echolocation or sonar; ultrasonic sounds produced in the animals` throat are projected forward at a rate of 10 or more pulse4s per second. These pulses reflected off any solid object are then received by ears and the intensity and character of pulse are interpreted by the brain (seeing by means of sound).
  - Insects that do not taste very good warn bats off by ultrasonic clicks. Some moths jam the bat`s sonar by noises that mimic the echo of a large solid object. The pursuing bat, faced abruptly with the prospect of flying full tilt into a tree trunk instead of catching a moth, swerves away and the moth escapes. Insects eating bats consumes 25% or more of their own body weight in insects each night. A single 7gram insect eating bat can catch as many as 600 mosquitos in one hour. Many of the bats in this group have evolved the ability to hibernate in order to endure (survive) the food shortages of winter. Closely related to the ability to hibernate is the retardment (slowing the development) of foetal development between conception during autumn and birth in summer. The young are weaned after three weeks. Insectivorous bats can live for 25 years or more.

❖ Primates (Order Primates) – this order is divided into two sub-orders, namely:

a) Sub-order Haplorhini – the simple nosed primates (Simians).
b) Sub-order Strepsihini – the turned nose, “early monkey” (Prosimians). Southern African species are represented by the shaded blocks on the diagram below:



❖ Primates are found in a wide range of habitats and display an extensive diversity of adaptations. Generally this order is characterized by:
- The development of flattened nails on the finger tips.
- The presence of toes rather than claws.
- The ability to move individual digits.
- An opposing thumb and a big toe that enable objects to be gripped.

1. The Bush Babies/Galagos (Family Lorisidae).

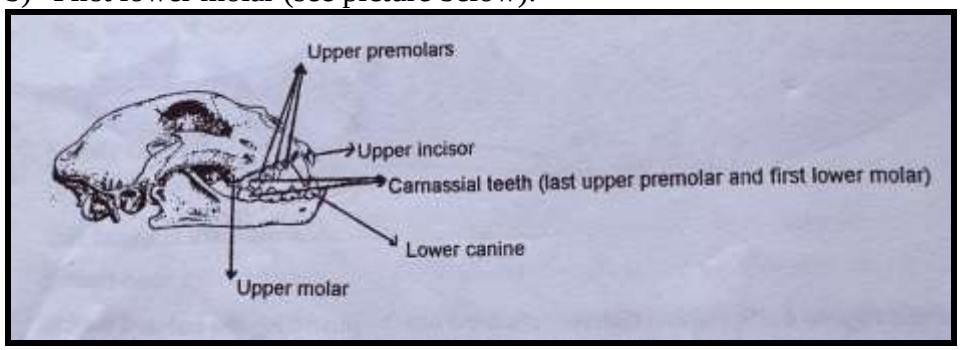
- This family fits in under the sub-order **prosimii** or lesser primates. The lorisidae have retained a well-developed sense of smell and unlike the higher primates, their faces are covered with hair. The most well-known members of this family are the nocturnal bush babies. Three species are found the Southern African region. They are: Lesser Bush baby, Grant`s Lesser Bush baby and Thick-tailed Bush baby.
- Their tails are longer than their bodies and are generally of a bushy nature, the function of which is for keeping balance. They have large eyes. Their hind legs are much larger than their forelimbs; this being an adaptation for leaping. A bush baby is able is able to cover 10m in less than five seconds. Their ears have a series of folds that enable them to orientate the outer towards the source of the sound
- They are almost incapable of moving their eyes within their sockets. This, they compensate for by being able to turn their heads to look directly backwards. Bush babies have a "tooth-comb" that is formed by the four lower incisors and two canines that are pointed and projected forward. The species like the lesser bush baby that feed on gum, use the comb-tooth to scoop the gum out of the tree bark. The comb-tooth also plays an important role in grooming. On the underside of the tongue lies another form of comb that has sharpened and hardened points that is used to clean between the teeth of the comb-tooth.

2. Baboons and Monkeys (Family Cercopithecidae) – the Southern African species includes: The Vervet Monkey, Sykes Monkey and the Chacma Baboon.
   - Their characteristics:
     - Baboons and monkey`s (Cercopithecines) have the same dental formula as humans and possess powerful jaws.
     - They have five digits on the fore and hind feet.
     - The first digit on both hands and feet may be opposed.
     - The hind feet are plantigrade that is they walk on the whole foot.

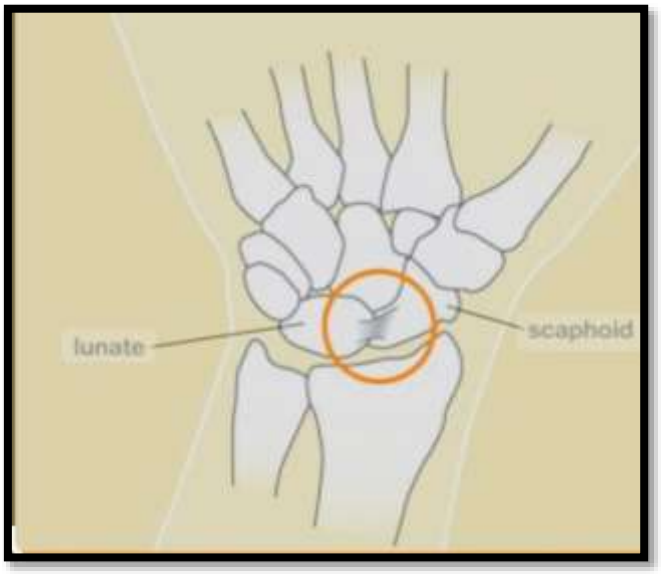
- They have rounded head with moderately long muzzles.
- The chacma baboon has a very well developed muzzle.
- They are not able to use the tail to grasp (not prehensile).
- Cercopithecines have check pouches that when fully extended can hold the same amount of food that their stomach can. When they compete for food, they stuff their check pouches full of food and move off to a safe area to eat it in comfort. Another characteristic of cercopithecines is the gesture of picking up their food and closely scrutinizing it before they swallow it. This may ensure that only high quality food is consumed.
- Baboons also have pads of tissue on their rumps that are hardened; called **ischial callosities.** These are often brightly colored and play a role in reproductive behavior. The female callosities are separated in the middle by a wide space, whereas in the males they are fused.

❖ Order Carnivora:

- Carnivores are animal product eaters, most often referred to as **"meat eaters"**, however carnivores may consume any part of another animal not only what is defined as meat.
- A characteristic that is shared by all carnivores is the fact that they all have **carnassial teeth.** The carnassial teeth are:
  a) Last upper premolar.
  b) First lower molar (see picture below).



- These teeth fit together to provide a shearing surface in order to tear and cut skin and flesh.
- The other characteristic that is shared by carnivores is the fusion of bones in in the foot. The Scaphoid, lunar & central bones are fused together to form the **scaphoid lunar bone.** This provide a firm basis for flexion and climbing as well as grappling with prey species. See picture below:



- The penis of members of all carnivores, with exception of the family hyaenidae; contains an elongated **bony** structure called the **baculum**. The function of the baculum is to prolong copulation.

❖ Carnivores – local species only:
- The Dogs – Sub-order Carniformia
  - True Dogs (Family Canidae) – African wild dog.
  - Dog super group (Family Canidae) – Black-backed jackal, Side-stripped jackal, Cape fox & Bat-eared fox.
  - Badgers and relatives (Family Mustelidae) – Weasels (Sub-family Mustelinae) – African stripped weasel & Stripped polecat.
  - Honey eater (Sub-family Mellivornae) – Honey badger.
  - Otters (sub-family Lutrinae) – African clawless otter & Spotted-necked otter.

- The Cats – Sub-order Feliformia:
  - True Cats – Family Felidae
  - Sub-family Felinae (The meowing cats – true cats) – Serval, Caracal, Black-footed cat & African wild cat.
  - Sub-family Pantherinae (The roaring cats – true cats) – Lion & Leopard.
  - Sub-family Acinonychinae (True cat) – Cheetah.
  - The Cat Super group (Family Hyaenidae) – Hyenas & Aardwolf.
  - Sub- family Hyaeninae – Spotted hyena & Brown Hyena.
  - Sub-family Protelinae –Aardwolf.
  - Civets & Genets (Family Viverridae) – Africa civet, Small-spotted genet, Large-spotted genet & Angolan genet.
  - Mongoose & Suricate (Family Herpestidae) – Slender Mongoose, Banded mongoose, Dwarf mongoose, Marsh mongoose, White-tailed mongoose, Yellow mongoose, Selous` mongoose and Suricate (Meerkat).
- The Cats - (Family Felidae):
  - The felids are the most carnivorous of the order Canivora. These members are characterized by:
  - Having round ears (see picture).
  - Digitigrade feet and retractile claws, (with the exception of the cheetah who has non-retractile claws; this is in order to assist the cheetah when running at high speed so as to gain traction from the use of claws).
- The Felids have:
  - Large eyes with binocular vision and a certain amount of color vision.
  - Their eyes adapt to darkness rapidly.
  - Their ears are large and their sense of hearing is acute.
  - Their sense of smell is less developed than the canids.
  - Their facial whiskers (vibrissae) are long, stiff and sensitive, and improve their night hunting.
  - Their tongue is coated with sharp-pointed papillae that lacerate food and aid in the function of grooming.
- The Dogs - (Family Canidae):
  - The members of this family are characterized by having:
  - Long legs (see picture)
  - Digitigrade feet that have five toes on the front foot and four toes on the hind foot (non-retractile claws).
  - Long muzzles and well developed jaws.
  - Bushy tails and their ears are conspicuous.

- The canids have flattened molars in the front of the carnassial that indicate a diet that is not purely carnivorous.
- The copulation process in canids is of long duration due to the presence of erectile folds on the penis (**bulbus glandis or swelling, or bulbo urethral process)**, that when swollen prevent retraction by the male.
- The African wild dog is the least typical of all canids, although their resemblance to modern domestic dog is closer than any other canid. They are exclusively carnivorous, have a short muzzle that is very powerful and have lost the fifth digit on the front foot.

- The Hyenas - (Family Hyaenidae):
  - The members of this family are characterized by:
  - Large ears (see picture)
  - Thick-set muzzles
  - Powerful jaws.
  - Claws that are non-retractile.
  - One of the most distinctive features of all hyenids is the presence of an anal pouch that lies between the rectum and the base of the tail. This pouch can be turned inside out. In the brown hyena the pouch is particularly large and discharges two distinct secretions from different glands lining the pouch. Although hyaenidae bear a resemblance to the canids; based on comparative anatomy, the closest relatives are viverridae. The dog-like characteristics have probably evolved through their adaptation to open habitats.
  - Hyenas will actively hunt to a certain extent, depending on the particular geographical area and the presence of other predators, but are mainly scavengers. They have unusual digestive systems, in that they can consume indigestible material such as bone, horns, hooves, ligaments and hair. This matter is often regurgitated. Spotted hyenas have large heads with large premolars used for bone-crushing. The carnassial teeth are used almost exclusively for slicing and shearing meat and skin. In the brown hyena the corresponding premolars are smaller as their diet includes insects, eggs and wild fruit.
  - The misconception of the spotted hyena being a **hermaphrodite** was based on the genitals of both sexes being identically masculine until puberty, when the female`s urogenital open and the mammae are enlarged. The penis-like organ in the female is however retained. Both species of hyena possess a well-developed forequarters, a back-line that slopes and a mane.
  - The Aardwolf is a shy nocturnal animal that is seldom seen. It feeds mainly on harvester termites that it appears to locate by means of sound. The Aardwolf has a sticky saliva that covers its tongue enabling them to lick up a large number of termites at a time.

❖ **Civets and Genets – (Family Viverridae):**

- **Mongoose and Suricates – (Family Herpestidae**).
  - This family is by far the most diverse of all the carnivore families (see picture).
  - Some of their characteristics features are similar to the cats, but they differ in having shorter legs, the length of their muzzle and they do not have rounded heads.
  - The members of this family are characterized by having well developed anal glands.
  - The feet of these two families vary from digitigrade to near-plantigrade.
  - They are omnivores and their canine teeth are relatively small.
  - Their diet consists of small mammals, birds, reptiles, insects, fruits and eggs.
  - They have excellent vision and hearing, this being due to a well-developed inner ear.

❖ **Badgers and Relatives - (Family Mustelidae)**

- The members of this family are widely distributed and are a mixed group of mammals divided into three sub-families. All members of this family have:

  - Long bodies (see picture).

- Short legs
- Anal glands
- There is considerable variety in their dentition (teeth structure).
- This family also displays a variety of foot structures, some are digitigrade and others are plantigrade. Some members have four toes and some possess five toes and their claws may either be retractile or not. Most of the mustelids are fierce hunters and totally carnivorous, preferring to consume freshly killed meat. The honey badger however, will also feed on honey and bee larvae and the otters also feed on crabs and fish. An important feature within the mustelids family is the presence of anal glands. The mustelid will discharge a powerful-smelling liquid called **musk** as a means of defense when frightened. A small amount is also secreted when the animal defecates.
- Mustelids have unusual reproductive habits. The sexes usually live separately and very seldom meet with each other and are usually aggressive towards each other when they do meet. When mating, the male grabs the female by the scuff of the neck and may even drag the female around with force before actually mating her. Copulation is a prolonged affair and often repeated. The mating behavior would seem to indicate that female mustelids will only be induced to ovulate through vigorous copulation. This type of prolonged copulation creates a situation in which the pair is vulnerable, but the advantage of certain fertilization outweighs the vulnerability.

❖ The Aardvark – (Order Tubulidentata).

- Orycteropodidae is the only family representing this order. Aardvarks are fairly secretive mammals and are usually nocturnal. However, they may be seen during daylight hours on cool winter days. Their feeding is very specialized (MYREME COPHAGY) feeding exclusively on termites and ants.
- The Aardvark has long ears and very flexible tubular snout.
- The body is covered in coarse hair.
- They have powerful short limbs with four digits on the front feet and five on the hind feet. The toes end with long sharp-edged spoon shaped claws.
- The nostrils are surrounded by a dense mat of hair that functions as a filter for dust.
- The Aardvark has continuously growing molars and cheek teeth, but has no canines or incisors. The cheek teeth dentine is covered by cementum (calcified bone-like tissue) and not enamel as in other mammals.
- They have a long, thin round sticky tongue and well-developed salivary glands. The stomach has a muscular pyloric area that grinds the food material, thus there is no need for the Aardvark to chew its food. Both male and female possess and anal scent gland that secretes a strong smelling liquid.

❖ The Pangolin (order Pholidota)

- The only family in this order is Manidae. It is represented in southern Africa by one species, the ground pangolin. The pangolin may be distinguished from all other mammals by their covering of scales.(See pic below):



- The scales of a pangolin that overlap each other from front to back are a form of modified hair. The scales provide protective amour in that each scale has sharp edges and ends in a sharp point. To improve their protection against predators they have the ability to curl up forming a tight ball, thus shielding the vulnerable underside. They also have an anal gland that secretes a substance that smells foul.

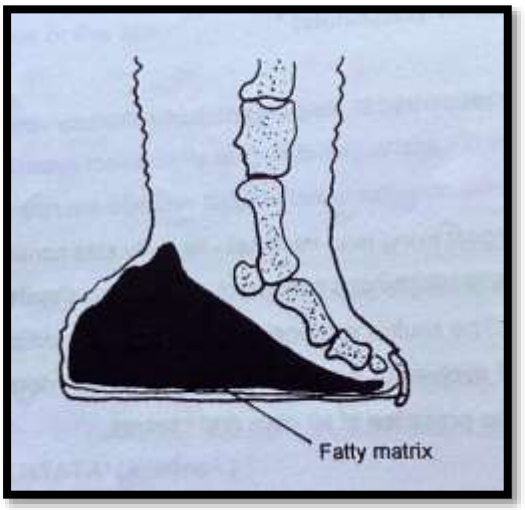
THEIR CHARACTERISTICS

- The Pangolin has a very narrow and triangular head.
- They have no teeth, as they feed exclusively on termites and ants (Myrmecophagy).
- Pangolins have no external eras and the nostrils can be closed by the use of special muscles preventing ants and termites from entering the nose.
- The tail although covered with scales is very mobile and stout.
- The gait is plantigrade and each foot ends in five digits with powerful claws.
- The central claw on the front feet is enlarged and used for burrowing. They usually walk on the hind feet and use the tail for balance.

❖ **The African Elephant (Order proboscidae)**

- **T**he African Elephant (Loxodonta Africana) is the only species within this order represented in southern Africa. This is the largest living land mammal with its body size continuously increasing with age. A specialized system for crushing coarse vegetable matter is formed by the skull, jaw and molar teeth. The large skull is disproportionate to the brain size, but the skull size developed to carry and support the trunk and heavy dental structures. Given the size of the skull it is relatively light due to the air cells and cavities within the skull. The skin varies in the thickness over the body and sparsely covered with hair.
- Elephant tusks are elongated upper incisor teeth that consist of a unique combination of dentine, cartilaginous material and calcium salts. The tusks are used in a number of different functions, namely for defense, prying the bark off trees, used in conjunction with the trunk to dig up roots and pull grass. The trunk is also used for sucking up water and transferring it to the mouth, caressing each other, squirting water, throwing dust/mud and for the amplification of sound production.
- The top lip and the nose are fused and extended to form the trunk. The trunk is a hydrostatic skeleton consisting of thousands of muscles that may be contracted and relaxed depending on the function being performed. The large ears have evolved to increase the body surface area and thus aid in the rate of heat loss. The ears have a large number of blood vessels that cause the blood to cool when the ears are moved back and forward in a fan like movement.

- The foot structure is between plantigrade and digitigrade. Elephants are known as near ungulates. They do not have hooves, but toenails. There are five toenails on the front foot and four on the back foot. These however, sometimes wear off and are not visible. See the bony structure of an elephant`s foot embedded in a **fatty matrix**: see picture below:



❖ **Hooved Mammals (the ungulates)**

- The hooved mammals (ungulates) are divided into four orders:
  - Order perissodactyla (odd-toed ungulates**)**
  - Order Surriformes (even toed ,bush pigs and warthogs)
  - Order Whippomopha (even toed hippos)
  - Order Ruminantia (even toed buffalo and antelopes)

The term ungulate is used to describe a group of mammals that through evolution have developed hooves instead of claws. This adaptation is to improve the running ability of the animal. All ungulates are terrestrial herbivores (ground dwelling plant eaters) that feed on grass, leaves, fruit, seeds and herbs. All ungulates stand on the ground to feed and are not able to make use of their front feet to grasp foot material.

Large amounts of cellulose that is relatively indigestible are consumed by most ungulates, however this cellulose needs to go through a process of fermentation by means of bacteria before digestion can take place. The ungulates have developed two different systems for digestion—RUMINATION and HINDGUT FERMENTATION.

1. **ORDER PERISSODACTYLA**-The members of this order are characterized by having either a single toe or a foot with three toes together. In the case of the three-toed ungulates, the weight is placed on the center toe. All members of this order are hind-gut fermenters. In Southern Africa this order is represented by two families:

- Family Equidae: contains two species, the Common/plain zebra and the mountain zebra(the cape and Hartmann's zebra are subspecies of the mountain zebra)
- Family Rhinocerotidae: contains two species, the white rhino and the black rhino

2. ORDER SURIFORMES-The members of this order all have weight-bearing toes on each foot. In southern Africa this order is represented by two sub-families; SUINAE-Bush pigs and PHACOCHOERNAE-Warthogs. (See picture)



3. ORDER WHIPPOMORPHA-The hippopotamus is from the sub-family hippopotamidae. This is the only even-toed ungulates in southern Africa to have four weight bearing toes on each foot.

4. ORDER RUMINANTIA-This order is represented by two families, family Giraffidae (Giraffe) and family Bovidae (buffalo and antelope).The family Giraffidae is only represented in southern Africa by the Giraffe and the Okapi in central Africa.
-The family bovidae is characterized by having horns present in males of all species and the females of certain species are usually smaller than those found on the male. The members of this family are all even toed ungulates with a ruminant digestive system.
-The family Bovidae is divided up into two sub families; Bovinae (divided into two tribes) and antelopinae (divided into eight tribes) represented in southern Africa.

a) Sub family Bovinae: Tribe Bovini-The African buffalo and Tribe Tragelaphini-bushbuck, sitatunga, nyala, kudu and eland.

b)sub family Antelopinae:Tribe Alcelaphini-wildbeest,hartebeest,blesbok,bontebok and tsessebe, Tribe cephalophini-duikers,Tribe Neotragini (dwarf antelopes)steenbok,damara,dik-dik,oribi,grysbok,sharpes grysbok and suni, Tribe Aepycerotini-impala,Tribe Hippotragini(horse antelopes)-Gemsbok, sable and roan antelopes, Tribe Reducini-reedbuck,mountain reedbuck,waterbuck,redlechwe,puku and grey rhebok, Tribe Oreotragini-klipspringer,Tribe Antilophini (gazelles)-springbok is the only representative in southern Africa.

Antelope species in which both male and females have horns:

- Blue wildebeest
- Black wild beest
- African buffalo
- Eland
- Gemsbok
- Bontebok
- Blesbok
- Springbok
- Tshessebe
- Red hartebeest
- Sable
- Roan

❖ The “FLAGSHIP”SPECIES OF SOUTHREN AFRICA(14.1.6)

A field guide need to know the following characteristics of the flagship mammal species:

- Gestation
- Number of young ones
- Lifespan
  (See table below)

FAMILY / COMMON NAME	GESTATION	YOUNG	WEIGHT	LIFESPAN
ERINACEIDAE				
HEDGEHOG	35 - 40 DAYS	1 - 9 (4)	400 grams	3
LORISIDAE				
LESSER BUSHBABY	125 DAYS	1 - 2	158grams	14
THICK TAILED BUSHBABY	132 DAYS	1 - 3	1,30kg	14
CERCOPITHECIDAE				
VERVET MONKEY	5,5 MONTHS	1	M6kg F4kg	12
SAMANGO MONKEY	5,5 MONTHS	1	M9kg F5kg	14
CHACMA BABOON	6 MONTHS	1	M33kg F15kg	18
MANIDAE				
PANGOLIN	4,5 MONTHS	1	5 - 18 kg	12
LEPORIDAE				
SCRUB HARE	42 DAYS	1 - 3	1 - 4kg	8
SCIURIDAE				
GROUND SQUIRREL	40 - 50 DAYS	2 - 6	1kg	7
TREE SQUIRREL	56 DAYS	1 - 3	200grams	8
PEDETIDAE				
SPRING HARE	77 DAYS	1	3kg	7
THRYONOMYIDAE				
GREATER CANE-RAT	90 DAYS	1 - 4	4 - 5kg	5
HYSTRICIDAE				
PORCUPINE	94 DAYS	1 - 3	12 - 18 kg	15
CANIDAE				
WILD DOG	70 DAYS	2 - 21	20 - 30 kg	12
CAPE FOX	56 DAYS	3 - 5	3,6 - 4,5kg	6
BAT-EARED FOX	60 DAYS	2 - 5	3 - 5kg	5.5
BLACK BACKED JACKAL	60 DAYS	1 - 6	7 - 10 kg	10
SIDE STRIPED JACKAL	60 DAYS	4 - 6	7 - 12 kg	12

FAMILY / COMMON NAME	GESTATION	YOUNG	WEIGHT	LIFESPAN
ORYCTEROPODIDAE				
AARDVARK	7 MONTHS	1	41 -65 kg	18
ELEPHANTIDAE				
AFRICAN ELEPHANT	22 MONTHS	1	M7tons F4tons	50 - 60
PROCAVIIDAE				
ROCK DASSIE (HYRAX)	7 MONTHS	2 -3	3 - 4,5 kg	12
RHINOCEROTIDAE				
BLACK RHINO	15 MONTHS	1	F800 M1200 kg	40
WHITE RHINO	16 MONTHS	1	F1800 M2000 kg	40
EQUIDAE				
Common ~~BURCHELL'S~~ ZEBRA	375 DAYS	1	300 - 320 kg	20
CAPE MOUNTAIN ZEBRA	365 DAYS	1	230 - 260 kg	20
HARTMANN'S MNT ZEBRA	365 DAYS	1	276 - 298 kg	20
SUIDAE				
BUSHPIG	4 MONTHS	3 - 4	60 kg	15
WARTHOG	5,5 MONTHS	1 - 8(3)	F57kg M80kg	18
HIPPOPOTAMIDAE				
HIPPO	8 MONTHS	1	1500 - 2000kg	40
GIRAFFIDAE				
GIRAFFE	15 MONTHS	1	F820kg M1200kg	28
BOVIDAE				
DAMARA DIKDIK	5,5 MONTHS	1	F5,6kg M5,1kg	9
ORIBI	7 MONTHS	1	F15kg M14kg	12
SUNI	6 MONTHS	1	F5,4kg M5kg	9
CAPE GRYSBOK	6 MONTHS	1	10kg	10
SHARPE'S GREYSBOK	7 MONTHS	1	7,5 - 11,5kg	10
GREY RHEBOK	8,5 MONTHS	1	30kg	9
KLIPSPRINGER	6 MONTHS	1	M 11kg F 13kg	15
BLUE DUIKER	7 MONTHS	1	F4,7kg M4kg	12
RED DUIKER	7 MONTHS	1	12 - 14kg	12

FAMILY / COMMON NAME	GESTATION	YOUNG	WEIGHT	LIFESPAN
MUSTELIDAE				
AFRICAN WEASEL	35 DAYS	1 - 3	250 - 350grams	5
STRIPED POLECAT	36 DAYS	1 - 3	640g - 1 kg	5.5
HONEY BADGER	6 MONTHS	1 - 4	8 - 14 kg	20
SPOTTED-NECKED OTTER	60 DAYS	2	4 - 6kg	15
CAPE CLAWLESS OTTER	60 DAYS	1 - 3	10 - 13 kg	15
VIVERRIDAE				
AFRICAN CIVET	60 DAYS	1 -4	9 - 16kg	14
LARGE SPOTTED GENET	77 DAYS	2 - 3	1,6 kg	13
SMALL SPOTTED GENET	77 DAYS	2 - 4	1,5 kg	13
SURICATE	65 DAYS	3	620 - 960grams	10
YELLOW MONGOOSE	60 DAYS	2 - 4	800 grams	11
BANDED MONGOOSE	60 DAYS	1 - 4	1,5 kg	11
WATER MONGOOSE	55 DAYS	2	2,5 - 4,2 kg	11
DWARF MONGOOSE	63 DAYS	2 - 3	350 - 400g	6
MELLERS MONGOOSE	55 DAYS	2 - 3	1,7 - 3 kg	11
SLENDER MONGOOSE	63 DAYS	1 - 3	M715g F575g	8
WHITE TAILED MONGOOSE	60 DAYS	1 - 3	3 -5 kg	12
HYAENIDAE				
AARDWOLF	90 DAYS	2 - 4	6 - 11 kg	12
SPOTTED HYAENA	90 DAYS	1 - 2	M60kg F80kg	20
BROWN HYAENA	90 DAYS	1 - 4	M47kg F42kg	24
FELIDAE				
LION	110 DAYS	1 - 4 (6)	M190kg F130kg	10 / 14 (18)
LEOPARD	100 DAYS	2 - 3	M 90kg F 60kg	21
CHEETAH	95 DAYS	1 - 6	40 - 60 kg	16
CARACAL	78 DAYS	2 - 3	12 - 20 kg	17
SERVAL	70 DAYS	1 - 3	M10kg F9kg	17
AFRICAN WILD CAT	65 DAYS	2 - 5	M5kg F4kg	15
BLACK FOOTED CAT	68 DAYS	1 - 4	M2,4kg F1,6kg	13