FLIGHT is an amazing accomplishment that evolved first in the insects and was observed subsequently up to the mammalian class. However, the word ‘flying’ brings to mind pictures of birds only.

But there are many other flyers other than birds in the animal kingdom who have mastered the art of being airborne. Different body structures and peculiar organs contribute to the aerodynamic stability of these organisms. Let’s take a look at some of them.

1. Gliding ant: Gliding ants (Cephalotes atratus) are arboreal ants of several different genera that are able to control the direction of descent while falling from a tree. They measure up to one centimetre long. While gliding they hold their legs elevated and outstretched above the main body, and their bulbous posterior body segment is fixed slightly below the body axis. This configuration is aerodynamically stable and creates a force that pushes the ant backwards in a controlled glide. They can make 180 degree turns in the mid-air.

2. Flying squid: In the Flying squid (Todarodes pacificus), commonly called Japanese flying squid, the mantle encloses the visceral mass of the squid, and has two enlarged lateral fins. The squid has eight arms and two tentacles with suction cups along the backs. In between the arms sits the mouth, inside the mouth a rasping organ called radula is present. Squids have ink sacs, which they use as a defence mechanism against predators. Membranes are present between the tentacles. They can fly more than 30 m in 3 seconds uniquely utilising their jet-propelled aerial locomotion.

3. Flying gurnard: Flying gurnards have pectoral fins that help them to fly. While flying their pectoral fins span 15 cm spread full, and they are airborne for about 2 seconds only. But they seem to be gliding in a controlled manner.

4. Flying fish: There are two types of herring-like flying fishes namely the two-winged and the four-winged flying fishes. Two-winged flying fishes only have enlarged pectoral fins, and in four-winged flying fishes both the pelvic and pectoral fins are enlarged, making two pairs of wings measuring 30 cm and 40 cm in length respectively. When they leave water for the air, sea birds such as frigates, albatrosses, and gulls are liable to attack. Its body lifts above the surface, it spread its fins and taxis along the surface, with the lower lobe of its tail fin moving in a sculling action. The lower lobe of its tail is longer than the upper lobe and is vibrated up to 50 beats per second. It takes off at 18 meter/second and lands with its belly or dives head down at a speed of 9 meter/second. Each flight or leap may cover up to 137 m and lasts up to 10 seconds.

5. Flying mobula: They have triangular pectoral fins, horn-shaped cephalic fins and a large forward facing mouth. They can attain a disc width up
to 5.2 m and can probably weigh over a ton. Mobula rays can reach heights of more than two metres and remain airborne for several seconds, then land with a loud bang with their belly and flop back into the sea. The higher they leap, the bigger is the bang.

6. Flying frog: Flying frogs include members of three different genera such as *Ecnomiohyla*, *Polypedates* and *Rhacophorus*. Alfred Russel Wallace gave the earliest report of the flying frog. The species he observed was described as Wallace’s flying frog (*Rhacophorus nigropalmatus*). These are characterised by enlarged hands and feet, full webbing between all fingers and toes, lateral skin flaps on the arms and legs, and reduced weight per snout-vent length. These morphological changes contribute to the flying frog’s aerodynamic abilities. It can descend at an angle less than 45° relative to the horizontal.

7. Flying lacertids: In flying lacertids the head and body are very depressed with frонтопариетal and occipital scales all fused into shields with a depressed tail. Their bones are packed with air spaces, flat body and tail, fused fingers and their low body mass makes them capable of gliding up to 30 m distance.

8. Flying gecko: Flying gecko (*Ptychozoon*) is a genus of arboreal geckos endemic to Southeast Asia. They are characterised by cryptic coloration and elaborated webs surrounding the neck, limbs, trunk and tail. These membranes help the gecko to conceal the gecko against the trees. When the gecko leaps into the air, the flaps are used to generate lift and allow gecko to control its fall. It can fly up to a distance of 61 m.

9. Flying lizard: In the Flying lizard ribs are connected with membranes and extended to create wing-like structures called ‘patagia’. Hind limbs are flattened with a flap on the neck which serves as a horizontal stabiliser. They can glide up to 61 m using their patagia supported by elongated thoracic ribs to generate lift forces.

10. Flying snake: There are five recognised species of flying snakes: (i) Ornate flying snake (*Chrysopelea ornata*), (ii) Paradise tree snake (*Chrysopelea paradisi*), (iii) Banded flying snake (*Chrysopelea pelias*), (iv) Srilankan flying snake (*Chrysopelea taprobanica*) and (v) Moluccan flying snake (*Chrysopelea rhabdopleura*). They use their aerobatics to escape predators, to move from tree to tree without having to descend to the forest floor and for hunting preys. To prepare for take-off, a flying snake slides to the end of a branch and dangles in a J-shape. It then propels itself from the branch with the lower half of its body, forms an S quickly and flattens its body twice its normal width. By undulating back and forth the snake can make turns.

11. Flying phalanger: In the Flying phalanger the gliding membrane is narrow, fringed with long hairs and stretches from the forelimbs to the hind limbs. In greater glider the patagium is a broader web of furred skin stretching from the fifth toe on the fore foot to the ankle of the hind leg. The tail is bushy. Their glides are very sudden and swift. The gliding feats are most spectacular in the greater glider, one is recorded as having covered 539 m in six successive glides. During a glide, phalangers lose height, and having landed on the next tree they run rapidly up the trunk for the next take off.

12. Flying lemur: Flying lemur has a membrane of skin from the sides of the chin which continues into a broad web down on either side of the body, taking in the forearm with all the fingers and the hind legs and toes and going right up to the tip of the tail. When disturbed it moves rapidly in the branch, climbs up the trunk and launches itself in a long smooth flying leap to the next tree, up to 137 m away.
13. Flying squirrel: There are 37 species of Flying squirrels of which the largest is the giant flying squirrel (*Glaucomys volans*) of Asia, and the smallest is the pygmy flying squirrel (*Glaucomys sabrinus*). They have a web-furred skin on either side of the body extending from the foreleg to the hind leg and ending on the tail. Before becoming airborne, a flying squirrel first leans its head to one side and then the other side followed by up-down movement which enables it to judge the distance it must need to travel to reach its landing spot. The landing is very accurate. Before landing the squirrel erects its tail, causing its head to rise vertically. This brings the body accurately on to the landing strip forming a cushion while landing.

14. Flying fox: Bats of the genus *Pteropus* belonging to order Chiroptera are the largest bats in the world. They are commonly known as fruit bats or Flying foxes. The genus includes 60 species of Flying foxes. Most common are (i) Black flying fox (*Pteropus alecto*), (ii) Livingstone’s fruit bat (*Pteropus livingstonii*), (iii) Mariana flying fox (*Pteropus mariannus*), (iv) Grey headed flying fox (*Pteropus poliocephalus*) and (v) Large flying fox (*Pteropus vampyrus*). As the name suggests, the head resembles that of a small fox because of the small ears and large eyes. They are true flyers. But they are not always skillful at landing. They may fly heavily into foliage and then clamber along to a branch, or fly over a branch, catching it with their hind feet to fall into the hanging position.

Different advantages that the flight adaptation provides to the animals include escape from predators, access to food, and mobility and manoeuvrability enables them to travel according to season to regions where climate, food supply and nesting sites are favorable.

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