

# Nature as the basis of flight

Science



**ASSIGN  
BUSTER**

Only in recent history has humanity been able to take to the skies using planes, helicopters, gliders and more, however nature has been airborne for many years before us and over few millennia through evolution has been able to improve their ability to fly. This makes looking towards nature, be that be birds, insects, or plants as large resource of knowledge when we are looking to innovate and improve our own aircraft of the modern day. Bees and other small flying insects are the oldest creature that can take to the skies, they also fill one of the largest gaps in our knowledge of how these small insects are able to fly.

There is quite large myth that says “ bees defy the laws physics each time it flaps its wings” this comes from time when our understanding of flight was not as vast as it is today, for example “ French entomologist August Magnan even noted that the insect’s flight is actually impossible” (1) now these statements we know them to be false now, however this is actually somewhat understandable as it does in fact seem impossible if you compare that of flight of a bee or a fly to that of plane, but that is wrong, as small insects are far more like helicopters and not conventional aircraft. But how bees fly is through a combination of three, the first being the bees wings are very flexible instead of just being able to move up and down they are also able to move from side to side as well, this in combination with rapid rotation of their wings with a high angle of attack from each stroke of the wing, and lastly they have a very fast wing beat frequency allowing them to flap their wing up to 230 times per second (2). With these three things the wing stroke creates a small leading-edge vortex at the tip of the wing. The eye of these

vortexes has lower air pressure than the surrounding air, this then will create small eddies of air above the wing allowing it to take to the skies (3).

The reason understanding the abilities of how a bee and other insects fly that it is the key to being able to make small drones. Said drones could be used for various things, like find an out what is not working within a large machine if you attach a camera it could be an easy way to look inside a larger object. It also can be used for carrying smaller objects from a to b and used as a courier service. Bees are also highly efficient animal, they can move across relatively large distances but with only small amounts of fuel, this is because they are incredibly efficient beings. For example, one thing that we have that bees do is through small sensors on their head they are able to detect the airflow and have a good sense of the airspeed, with that they then will lower or move up their abdomen allowing them to morph their shape becoming more streamlined when they see fit. This allows them to save as much energy as possible (4). This is very useful for humans as this tells us we can create aircraft that is able to morph to be efficient.

For example, this highly useful for aircrafts as they can change and morph their shape for long distance flights to save fuel, cruising flights and being able to stabilise a flight if needed mid-flight, this over all will create not only more effective flying system for the airliner but also be able to create a more enjoyable and stable flight for the passengers aboard. We can also look at bees to possibly find are far more effective and smooth method of landing aircrafts. There has been lost of research years in bees and insects in general one of which has looked at the moments before the bee lands on the

ground, they did this by taking a high-speed camera and film the bee just before it hits the ground.