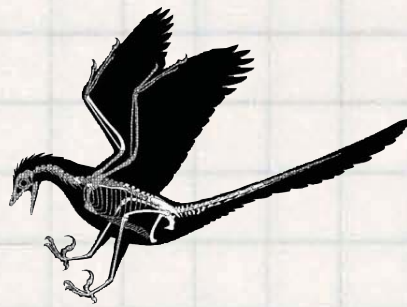


# Spitfire

We're going to embark on a long journey that's going to take us from the dinosaurs through to one of the most significant aeroplanes ever built - The Spitfire. The origins of bird flight is still a little unclear, but paleontologists tell us that birds evolved from the small THEROPOD dinosaur. Flight developed after the evolution of feathers.... and what do you think caused that ?

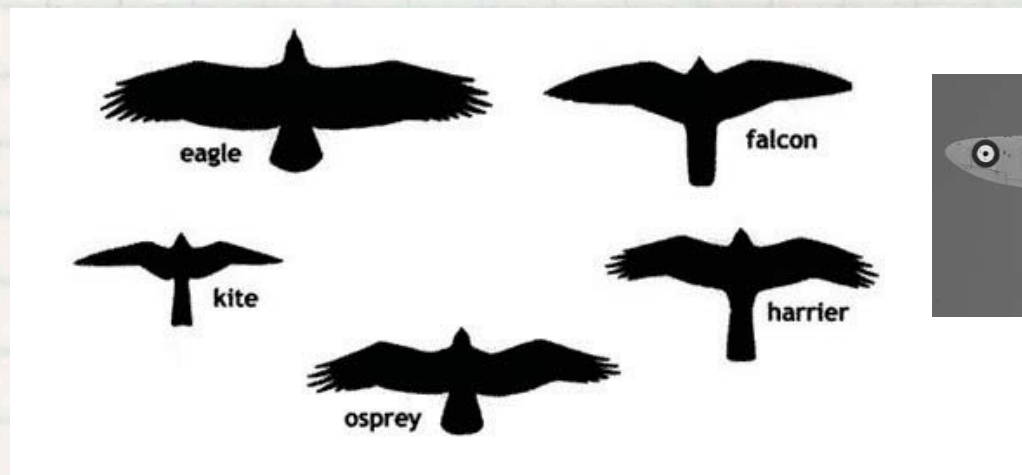


## Why do birds fly?

- To display and attract a mate
- To chase and eat insects
- To go looking for food
- To travel to feeding grounds
- To look for and acquire nesting materials
- To migrate between the seasons
- To escape quickly from predators
- To reach isolated places for nesting

## Why do humans fly?

- 
- 
- 
- 
- 
- 
- 
- 
- 



**BAE SYSTEMS**

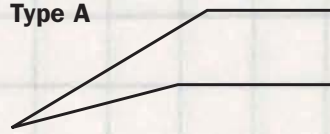
Ever since man has wanted to fly, he has looked for inspiration to those who do it best... birds. A bird's wing is a very complicated structure of bones, muscles and of course, feathers. Not all birds have the same shaped wings because in nature they behave differently, and have different habitats.

**Read the descriptions of different types of birds' wings and see if you can match the description to the shape of wing shown.**

#### Type A

This type of wing can be flapped very quickly and can support quite a heavy bird for short bursts of very high speed, but it isn't designed for long-distance work, because flapping uses up a lot of energy! It can be folded in very easily which means that the bird can land at high speed, often on water.

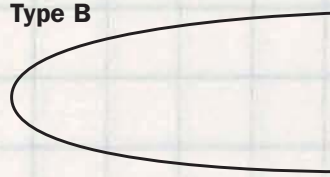
#### Type A



#### Type B

These are wings for large heavy birds which fly at altitude. They are often used for gliding or soaring and the air flow is controlled by spreading the feathers at the wing tip. These birds have broad bodies and relatively small, sleek heads. They do not need to escape from predators because they have superior physical capabilities.

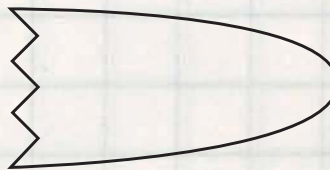
#### Type B



#### Type C

These wings are very useful to birds which need to make a quick get-away! The shape means that the bird can take off very quickly, climb quickly through the air and turn easily. This is useful for birds of all shapes and sizes wanting to get away from predators.

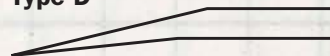
#### Type C



#### Type D

These wings are for birds which need to travel long distances, where speed is not important. This is often at sea, where they make good use of the wind over the waves. These wings can be pulled quickly back to make a high speed dive under the water, but it requires a lot of energy to get airborne again.

#### Type D



**How can designers and engineers learn from the birds?**

**Let's think about how we can use the shape of various birds' wings to help us design a variety of aeroplanes for a variety of uses:**

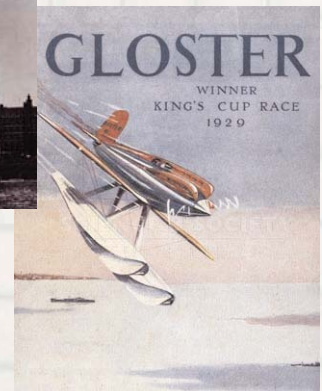
- To carry many passengers on long flights
- To glide without an engine, using thermals
- To fight with enemy aircraft (this is sometimes called 'dogfighting')
- To travel faster than the speed of sound

## THE DESIGNER OF THE SPITFIRE

Reginald Mitchell was born near Stoke on Trent on 20 May 1895. He left school in 1911 and joined a local firm of engineers who built and designed locomotives, supplying the needs of a busy railway transport network. But the young Reginald decided that he needed to learn more skills and so he went to night school and studied technical drawing, engineering, mechanics, higher mathematics and practical engineering. All this whilst doing a demanding job during the day!



Up to this point his interest in aircraft had only been a hobby; he had built and flown model aircraft, but early in 1917, aged 21, he left Stoke and went to join the 'Supermarine Aviation Works' at Southampton. In the next four years, Reginald proved that he had lots of ability and he was made chief designer. During the next ten years, Reginald was responsible for leading a team which made a long and very successful series of aircraft which could take off and land on water. These are sometimes called float planes, flying boats or amphibians. **Mitchell used the elliptical wing shape designed by nature for birds! It was the use of this wing that was to later to prove so essential to the success of the Spitfire design.**



*I wanted to win the Schneider Trophy by building the fastest aircraft the world had ever seen. My 'Sea Lion' won in 1922, by reaching 145mph. The next few years were victories for the Americans and French, but in 1927, our team from 'Supermarine' were back with the S5: we had had to work hard to make the plane lighter and to keep the hard-working engines cool, but at 281mph, no-one could catch us!*

**BAE SYSTEMS**

## AN INFLUENTIAL PERSON IN THE DEVELOPMENT OF THE SPITFIRE

### Lady Lucy (Poppy) Houston

Lucy was born in London in 1857. Her family had very little money and she was the youngest of seven children. She was an intelligent girl, but she didn't particularly like school and by the age of sixteen, she had decided that she wanted to become a dancer. By now she was known by her nickname-Poppy- and this was to stay with her for the rest of her life. She had lots of determination and although many people tried to put her off a career on the stage she succeeded and soon found herself in Paris, married to a wealthy man, who left her £7,000 when he died in 1881, a vast sum in those days!



Poppy was still a young woman, only 24, and in the next few years she was admired and courted by many men, including, perhaps Winston Churchill! After two more husbands, she became the friend of kings, explorers, politicians and writers at her famous dinner parties. She was very patriotic and had a strong sense of justice, using her money to make a difference to people's lives. As an early supporter of the Suffragettes, one of her crazier schemes was to buy 615 parrots and teach them to screech 'Votes for Women!'.

*How sad I am that we are at war and that our brave soldiers are suffering the terrible wounds inflicted on them in dreadful battles. When I visit the hospitals treating the wounded and dying, I am astonished by the dedication of the nurses and doctors, many of whom make themselves ill by working so hard. I shall set up a rest home for them, since I believe that our government is neither looking after them, nor our poor heroes from the Great War.*



Following the death of her fourth husband, and by now nearly 70, Lady Poppy had inherited his £6,000,000 fortune: she was by now the wealthiest woman in the world! Her patriotic feelings were as strong as ever and her real fear was that her beloved country was heading towards a second world war without being adequately prepared



**Reginald Mitchell says..**

*I've just returned from a convalescent holiday in Germany and I'm very worried by what I have seen there. The German fighter aircraft are so much better than anything that the RAF have at the moment. I need some more money to develop my ideas for a high-speed aircraft. Why can't the government see how important this is?*

*I can't believe that this government isn't spending enough money on the army, the navy and the air-force! Why can't they see that we need to defend our country against Germany which is spending millions on developing its forces, particularly its air force. I believe that we need to develop a good fighter plane to take on the defence of this island and I am going to give £100,000 to Mr Mitchell and his team at 'Supermarine' to develop an aeroplane which can beat anything that Germany can produce. We must be able to fight other aircraft back from our island and stop them bombing our towns and cities. I've heard that Mr Mitchell thinks his new plane might achieve 407mph. I think I'll invite him to visit me...*



**Reginald Mitchell and Lady Poppy Houston meet ...**

Both Reginald Mitchell and Lady Poppy were worried about the same thing: the threat of war. Between 1931 and 1936, Mitchell had to provide the Royal Air Force with a fighter that was easy to fly, leaving the pilot free to concentrate on shooting down the enemy.

When Reginald Mitchell and Lady Poppy met, Great Britain's air defence relied on bi-planes, like the one shown below. Although Reginald Mitchell's sea plane, the S6 was designed mainly for speed, he quickly saw that he could use the knowledge he and his team at 'Supermarine' had learned to completely transform the bi-planes into effective fighters.

**BAE SYSTEMS**

**Use these details to imagine a conversation between Reginald Mitchell and Lady Poppy where they talk about the changes that the threat of war would need to bring to the bi-plane.**

Begin by looking at the facts...

The cockpit is open which will limit the altitude because of air pressure and there is no protection for the pilot from enemy fire.

The frame is very light and cannot carry heavy machine guns and ammunition.



The plane is covered with fabric which can be easily damaged, and doesn't make the plane strong.

There two wings give the plane lots of lift, but are not very agile in dives and climbs.

The undercarriage (landing gear) is fixed which means that there is drag which slows the flying speed of the plane.

This bi-plane can't get to the height (altitude) that we need to be effective in surprising enemy aircraft wanting to attack us.

The engine isn't big enough to be able to perform aerobatics and dodge or chase other high-speed fighters.



**Add your own caption in the space above**

**BAE SYSTEMS**