

The Adaptations of Articuno

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Abstract

The bird type Pokémon Articuno has adapted to live in his cold, icy habitat on the Seafoams Islands. This paper discusses the adaptations he has developed and how they benefit him. His small surface area to volume ratio, dense feather arrangement, hydrophobic feathers, and blubber help him conserve heat. His long tail supplies him with extra warmth when he is sleeping. The lock wing mechanism allows him to fly without flapping his wings for thousands of miles. His talons, eyes and strong claws allow him to catch and kill prey quickly.

Keywords: *Anime; Biology; Adaptations; Pokémon; Articuno*

Introduction



Figure 1 – Shows Articuno who is one of the three legendary bird type Pokémon in generation 1 and 2 [1].

Articuno, from the anime Pokémon, is one of the three legendary birds. His name in Japanese means 'Freezer'. The first part of his name comes from 'Artic', and the second part comes from the Spanish word 'uno' (which means one) [2, 3]. From his name it is no surprise that his powers involve controlling ice. He resides in mountains covered in snow, usually filled with permafrost on the Seafoam Islands [2]. It is assumed that these islands share a similar climate the Arctic. This paper

will discuss how Articuno has adapted to his cold environment.

Surface Area to Volume Ratio

According to Allen's rule, the body shape of an animal depends on the climate they reside in. Animals that live in colder climates, will have rounder bodies which will decrease their surface area to volume ratio [4]. This is true for Articuno. As seen in figure 1, his body forms an oval shape and his large size (approximately 5 feet tall) [2]. This adaptation will reduce his heat loss as his large volume will mean his body will need increase their production of heat, but his small surface area will mean that less heat will be lost.

Insulating Feathers

Articuno has thick blue feathers covering all his body (excluding his wings) as seen in figure 1. Like Antarctic penguins, his feathers most likely contain miniscule pores [5]. These will allow him to trap air which will act as an insulator to keep him warm in harsh weathers. This air will supply Articuno with up to 84% of the heat he needs to stay warm [6]. Additionally, the feathers are very densely packed which means that it is hard for cold air penetrate through them [6].

Hydrophobic Feathers

Articuno must enter the water to hunt for fish. Even if this is for a brief period, the cold, icy water

will instantly freeze his wings and legs and kill him. When diving into the water, Articulo ensures that his feet do not enter the water as they are not protected by feathers [5]. The feathers on his body have adapted to become hydrophobic so the water will instantly slide off him and cannot penetrate past them [5]. Moreover, like Antarctic penguins, he most likely produces an oil from the glands at the end of his tail which he can apply over his feathers [5]. This oil acts as an anti-icing solution- it makes his feathers superhydrophobic so the icy water will not affect him [5].

Blubber

The superhydrophobic feathers will not be enough to avoid freezing when he is within water. He has a thick layer of blubber keeping him warm [6]. Blubber is a layer of thick adipose tissue that acts as an insulating layer for animals. It is very densely packed with blood vessels so it can induce vasoconstriction of the blood vessels when he is in the water [7]. Vasoconstriction is when the blood vessels become narrower. This decreases blood flow to surface of the skin, which minimises heat loss [8].

Long Tail



Figure 2 – Shows a Siberian Husky conserving heat by curling up and covering sensitive areas like his paws and nose with his tail.

As shown in figure 1, Articulo has an elongated tail with long feathers. When he sleeps, most likely in a curled-up manner to limit movement and conserve the most heat, he can wrap his tail around his body for extra warmth like Siberian Huskies as seen in figure 2 [9]. There is no fur on his legs and feet- these areas will be the most prone to heat loss as they are not covered with feathers. Whilst sleeping, he makes sure his legs and feet are curled up and covered with the tail, almost like a blanket to avoid heat loss [10].

Wings

Articulo's wings are very powerful. It is believed they are made from ice and can generate huge amounts of gust to defeat his opponents. An animal of his weight (50.9 kg), must have strong wings to allow him to fly, especially in harsh conditions [2]. Like an albatross, he most likely uses a locked wing mechanism [11]. This allows him to lock his wings into his shoulders, so he can glide and soar through the air for thousands of miles without having to flap his wings [12]. This mechanism, combined with his aerodynamic, raptor shape means he can even fly against strong winds effortlessly [13]. This is advantageous for him as it means he can conserve his energy when flying. His colour and large shape will make him a target for predators and hunters but being able to fly endlessly will protect him.

Predator

As mentioned above, Articulo must spend most of his time in the air. He has very good eyesight due to the size of his eyeball and eye muscles which are adapted for rapid focus [14]. This means he can spot food on the ground below, so he knows when to swoop down and catch his prey. His sharp talons can sink into the skin of prey to kill them instantly [14]. He can hold them in the air due to strong muscles in his legs [14]. This allows him to carry them to a safe place where he can rip into their flesh easily using his hooked beak. This allows Articulo to only come down to the surface when required and to eat his prey in a safe region.

Conclusion

Articulo has many adaptations which enable him to thrive in his habitat on Seafoam Islands. To limit heat loss, he has a small surface area to volume ratio. The dense arrangement of the feathers and pores in them enable him to trap heat for thermal insulation. His blubber also helps him stay warm and insulated. While sleeping he can wrap his tail around him to avoid heat lose through his unprotected legs and feet. His wings have a locked wing mechanism which enables him to stay in the air for thousands of miles without getting tired. His sharp eyes, talons and hooked beaks means he can quickly come down from the air only when required, grab his prey, and take it to a safe place to eat.

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