

Bonhima Jungle's Cursed Snake-Duck

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Bonhima : Jungle's Cursed Snake-Duck

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Igor Guidolin

Abstract

Terra Incognita is a term that fascinates and incite the imagination in people. The unexplored places are the ones filled with horrors and rewards, being it outer space, the depths of the oceans or, as in this case, the darkest spots of the Jungle.

Setting the location is fundamental, as the hybrid has to be related to the environment chosen to really feel that it could be a part of that ecosystem, and the place also serves as a starting point where all the concepts will derive from.

Analysis on anatomy of the animals selected is also important, as their skeletons and muscles dictate how they will move and this being a production for a moving picture artefact, maintaining the original movements of the animals will help to sell the idea that the creature is alive and in its habitat.



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Introduction

This study is aimed to research and select useful and relevant resource material about the Horned Screamer (*Anhima Cornuta*) and the Coral Snake (*Micrurus Lemniscatus*) to create a hybrid of the two animals.

Having a strong base is fundamental to create a credible and appealing creature design, the specifications about its habitat, behaviour and anatomy present here can be translated not only to the visual design, but also in the ways it behaves and moves as this creature will be part of a moving picture artefact.

How to use the resources available in the production is also important and will be analyse. Having an initial idea on how the creature will be present in the shot can make it easier to design and animate accordingly.



Research

Here will be introduced and analysed features of the two animals selected that later will be used to create the hybrid.

Mythology / Folklore

The design of Quatzecóatl, the feathered snake from Mesoamerican mythology, is a great example of the style the hybrid should be as would be interesting if it relates to aspects of Mesoamerican iconography. (see Appendix A)

The composer Paulo Cesar Pinheiro, who has been studying Brazilian folklore for decades, released an album named Capoeira de Besouro, (Letras, 2018) where many aspects of folklore are present in the lyrics of the songs. One of the most interesting is Toque de Iúna, where he sings about an entity that is a snake but also a bird and has various similarities with the Quatzecóatl myth.

The bird known as Iúna - Horned Screamer (*Anhima cornuta*) is famous due to its habit of alerting animals and humans alike of approaching danger, it has connections with the sacred in Tupi-Guarani mythology as, with his beak, sucks the soul of the dead and becomes its guardian. Also, shamans and wizards often transform into this bird. (Bezerra, 2021)

The Coral Snake is also mentioned in Pinheiro's song, and this animal is a symbol of protection and healing in indigenous culture. (see Appendix B)



Habitat / Behaviour

Anhima Cornuta



Culbert, D. (2012). *Anhima cornuta*. Wikimedia Common.

The Horned Screamer is a territorial bird and does not migrate, lives in pairs within small groups of five to ten individuals that select an area of around 100 square meters and establish their nests there. (Arnosky, 2006)

These small groups live not too far from each other and communicate through vocalization from selected treetops. Usually in pairs, they start to sing at sunrise, then have a break to feed on mats of floating vegetation and vocalize one more time before going back to roost. When one pair starts to sing others from other groups answer, they vocalize when aware of being observed or another group approach their territory, but the loudest is when other birds land near or inside their territory. Every time these calls are made the bird bobs his head



up and, in more intense situation, they elevate their wing and lower and spread their tails. (James et al. 1986)

The Horned Screamer is the only bird who has a horn in his head used only as an adornment for reproductive reasons as it can easily break off. But they are not inoffensive, as they have a 2 to 5 cm long pair of sharpened bone spurs at the top of their wings to defend their territory and fight for mates, is not uncommon to find broken spurs inside bodies of intruders. (Arnosky, 2006)

The Anhimidae was the first diversion of the Anseriformes, making it the oldest Anseriforme alive (see Appendix C), and they have similar physiologic characteristics of ancient birds that were not able to fly. The Horned Screamer only flies for an average of five seconds at time, usually to get to treetops to vocalize. (Eo et al. 2009)

Micrurus Lemniscatus



Deschandol, F. (2014). *Micrurus Lemniscatus* Head. Wikimedia Commons.



There are 34 known specimens of Coral Snake in Brazil and more than 80 in all South America. (see Appendix J) For this study I'll focus on the *Micrurus Lemniscatus*, a large coral snake with an average size of 45 cm, can be found in the Amazon rainforest and prefer open vegetation or swampy areas to live.

They are solitary individuals, as the mother leaves the nest as soon as the eggs are laid. The *Micrurus* family diet consist mainly of other snakes, also eating their own species and they do not exhibit social communication except during mating season, where still accidents can happen and the partner becomes dinner.

Coral snakes hunt by moving their head side to side and sticking out their tongue to perceive the odour footprint of the prey, after finding it they inject venom and wait, following it from apart and injecting more venom if necessary. After the prey is dead or unconscious the *Micrurus* identify its head and swallows it through a process called jaw walking. (Abidh, 2012)

The coral snake highly toxicity is related to its diet, as it feeds on lizards, caecilians and other snakes, animals that often are resistant to venom or have it themselves. (see Appendix D)

When in danger, coral snakes display a defensive mechanism where they jerkily move their bodies to another position maintaining their tail curled and elevated so that predators may confuse it with their head. (Moore et al. 2020)



Anatomy

When designing a creature is essential to study the anatomy of similar animals in nature, as the bone structures and muscles influence the way the creature looks and having an indication of an underneath bone structure in the design, such as an eye socket or the elbow, helps to create a more realistic being.

Is possible to understand about how animals move by looking at their physiology, a principle based in Darwinian evolution where the adaptive pressure influence the change of a structure, for example changes in the musculature can alter the bones configuration of species. (Darwin, 1859)

This section will go more in depth about the musculature of the Anhima, as this information can be useful if developing the model with *Ziva FX* plug-in.

Anhima Cornuta

By analysing its musculature is possible to note an underdeveloped muscle mass in the pectoral region and in proximity of the humerus. An area usually quite developed in the Anatidae group, as it is related to the up and down movement of the wings. The pectoral muscles in the Horned Screamer have the form of flattened and laterally extended fascicles and could be related to the rigidity of the rib cage during flight. (Manzanares, 2013)

The muscular fascicles responsible for the movement of the humerus, on the other hand, are overdeveloped compared to components of the Anatidae group and indicates great force exercised in that area, also the fascicles that act in the stabilization and rigidity of its shoulder girdle are quite strong allowing it to perform better movements during its locomotion and gives rigidity to the shoulder during flight. (Manzanares, 2013)



The muscles that act in the extension and flexion of the elbow and in the joint movement of the arm and forearm are quite heavy and developed but, in this case, is not related to its capacity of locomotion, instead it is related to the bone spurs present at the top of the Anhimidae wings. (see Appendix E) As to expose the spurs they flex the elbow and raise the forearm and such movement requires great activity of the muscles that participate in the flexion and movement of the forearm. (Manzanares, 2013)

The Anhimidae family is the only birds that do not have an uncinate process, a bone protrusion that connects the rib with the one behind which is hypnotised that, acting as levers, improves the rotation forward of the dorsal ribs, which lowers the sternum and allows birds to breath, as they do not have a diaphragm like mammals. (Tickle et al. 2007)

Micrurus Lemniscatus

Snake's skeletons are composed of three parts, the skull the extremely flexible vertebrae and various ribs. (see Appendix K, Fig. 8-9)

Coral snakes have proteroglyphous skull, which means immobile fangs in front of their mouth hollow like a syringe needle to inject venom. Their skulls are extremely flexible allowing the snake to swallow large preys as the mandibula is connected to the cranium only by ligaments and the jaw is not connected at the front and can spread open. Behind the eye socket venomous snakes have a muscle that allows it to compress the venom gland and produce the venom to inject their prey. (Explanation-Avenue, 2023)

One popular method of analysing if a snake is venomous is to look at the shape of their head to see if it is triangular, this folklore could have been created due to this muscle that, in snakes that inject a large quantity of venom, is quite developed giving its head a triangular shape. But not all venomous snakes have a triangular shape head, and one example of it is the Coral snake, that does not need to inject a large quantity of venom due to its potency, as is the most lethal venom of all the New World snakes.



Methodology

To state what will be covered on here; a superficial analysis of current state of cinema, design ideas and a discussion based on the resources, suggestions on the animation plus useful software and plug-ins to achieve the desired effects.

Market Analysis

Marvel released 4 movies about superheroes this year, but the top three box office movies of 2023: Barbie, The Super Mario Movie and Oppenheimer. This could be sign of a trend that is falling in popularity, opening space for new movie ideas. (IMDb, 2023)

News worldwide about the Mayan's mummies and the supposed relation of it with aliens incite curiosity in people, a good theme to explore in a VFX's production. Such news could revive the Mayan trend that had a golden age from 2006 to 2016. (see Appendix F)

Design

Understanding the animal's characteristics is essential to design a creature that could exist in the real world. The information and reference gathered was aimed to not only create a graphic representation, but also include the movements and different behaviours of these animals, so that the animators also have a reference and can contribute to maintain the hybrid closer to its original inspiration.

Mythology and folklore also play an important part in the design of the creature, as often folklore is created by observations of the real world and people that live in these areas could have described an aspect that would not be noticed by an outsider of that environment.

Artefacts such as the sculpture of Xiuhcoatl, (see Appendix A) which is a snake that has two bird legs with four claws each and looks like a



three-snake coming down from a branch. This design is quite readable and simplistic, with a clear silhouette and connects with the habits of the Horned Screamer as it flies to the treetops to vocalize.

When designing the hybrid there are a few common representations that should be avoided, such as the snake with wings. The hybrid will be a more of an Anhima with snake features, which will make it more original and interesting. To support such design, I went to National History Museum in London, to collect reference material. (see Appendix G)

When modelling the creature is important to maintain the texture of both animals, the concept art (see Appendix I, Fig. 7) illustrates the first idea for the hybrid. It is not a snake on top of the bird, but the spine of the bird is replaced by the snake's vertebrae (see Appendix K, Fig. 9) so the hybrid will be extremely flexible. (EXPLANATION-AVENUE, 2023)

The snakeskin will cover the exposed part at the top of the Bonhima and fade into bird skin covered in feathers. The beak would have it outer part like the Anhima's, but the inside would look like the inside of a Coral Snake's mouth. The head will have snakeskin underneath but the plumage of the Anhima (with a few patches missing) and the horn.

Having an origin story developed following the behaviour and myths created around the animals helps to make better design choices when developing a hybrid (see Appendix H), also drawing studies of the animals help building a more credible being. (see Appendix I)



Production

The first step is to have a reference when shooting the live action, so the actors can have an indicator of the creature's head. Similar to what have been done in *Avatar*, a tennis ball could be hold at the height of the creature related to the protagonist, as if it is a short alien, the ball has to be hold higher than if it is a human.

Modelling and animation can be done with *Autodesk Maya* in combination with *ZBrush* for sculpting and mesh cleaning. For animation *Maya* has a variety of useful plugins that could be used such as *Ziva VFX*, as it can be used in conjunction with the specifications in muscle anatomy of the *Anhima* present in this study. This plugin was also used in *Avatar* and, while the animator still creates the movement, the changes in the musculature underneath the skin will happen automatically thanks to the plug-in.



Proposal Plan

Here is a breakdown of the creation of Bonhima, (from Tupi *M'boi*: snake and *Anhima*: large bird) a mythological being created by Quatzecóatl himself.

Space themes has always been a passion of the audiences and fits perfectly with the mysteries of lost civilizations.

My proposal is the story of an alien had to make an emergency stop on earth to refill his spaceship with a substance present in the jungle.

He arrives in the Americas when it was ruled by the Gods of Mesoamerican religions and, while searching for the substance to use as fuel, he enters the territory of the Bonhima, a hybrid of creatures cursed by the God of creation, which is incapable to feel fear of the unfamiliar and, if someone dares to enter its territory, the cursed bird will chase the unfortunate explorer through the thickest and darkest parts of the jungle, and will not cease its hunt until the invader is dismembered in front of its eyes.

This proposal may remind of the *Alien vs. Predator* (2004), which could evoke a nostalgic feeling in the audience, but would not have as much gore and be more of a thriller, with a very relaxed and documentary like atmosphere following the alien protagonist encountering the nature of earth, guided by an indigenous person, and meeting the coral snake and the Anhima in this process.

These scenes would be live action with a CGI short alien that reminds of the mummies from Mexico, but around the beginning of the second act the alien would localize the fuel inside the hybrid's territory and the native would tell him about Bonhima's origins (see Appendix E) with a 2D animation made following the style of the Aztec manuscripts such as the *Codex Borgia*. (Diaz et al. 1993)



The Bonhima will be first introduced in a dark part of the jungle, where the sunlight cannot penetrate the thick vegetation. The protagonist will hear its calls without being able to see it, as he looks up following the direction where the noise came from, but the lush vegetation does not let him see the trees canopy.

With a close-up of the protagonist looking up, behind his head would spread the feathers of the Bonhima's tail, (see Appendix G, Fig.3) which is a behaviour that Anhimas assume to show aggressivity, with the coral tail at the middle following the hybrid's design, forming the silhouette of an Amazonian native headdress. (see Appendix I, Fig.6)

The protagonist will look back and see the whole creature with the head lowered and coiled like a snake ready to attack, its mouth open showing the fangs dripping with poison and the snake tongue frenetically moving. The chest will be lower while raising its wings and showing the spurs, the back will be elevated with the feathers at the tail spread and the snake tail will be curled at the top. (see Appendix I, Fig.7) A similar scene is when Jake meets the Thanator in *Avatar* (2009)

The chase scene that follows could have a few Bonhimas hunting the protagonist and displaying the hunt behaviour of Coral snakes with their heads. Having more than one model would give diversity and make it more interesting, to differentiate the creatures is possible just to change the pattern at the top of the snake as Coral Snakes have a variety of colours and shapes, and also the Anhimas have different patterns. (see Appendix J)

The Bonhimas would not fly after the protagonist but glide from branch to branch, as they have limited capabilities flying. With a combination of flying and running they become quite fast and when animating such scenes is important to remembering the extreme flexibility of the Bonhima's spine that is the same of a snake and could create very interesting movements for these creatures.

On the run animation, and the way the hybrid generally moves, there are a lot of opportunities to be explored, they could slither like snakes



and be able to coil and throw themselves into the air like a spring with jumps higher than the snakes that hunt with this method, as they also have the feet to give them force, and while in the air they close their wing in an effort to become as aerodynamic as possible using their horns as a spearhead trying to hit the protagonist, and if missed they quickly turn their head trying to bite him before is too far.

When jumping from branch to branch they can use their spurs as hooks to grab the branches and use the strength of their wing muscles to move a bit like a monkey. (See Appendix G, Fig.4) Occasionally they jump on top of the protagonist with the legs in front like an eagle ready to clutch his arm and sink its claws into flesh, (see Appendix G, Fig.1) and the spurs on the top of its wings facing the prey ready to be used as a stab mechanism.



Conclusion

The habit, behaviour and anatomy research were extremely important to the develop of the creature visual concept and movements.

The main features of the Bonhima are:

- **Beak** composed of an outer shell identic to the exterior part of an Anhima's beak, but the interior would look like a Coral Snake mouth, with proteroglyphous teeth positioned not at the extremity of the beak but at the middle. (see Appendix I, Fig.1)
- **Head** will be shaped as a snake head, with snakeskin, but the eyes will be the ones of an Anhima, with the horn and patches of plumage from the Anhima's head.
- **Neck** will be the body of a Coral Snake, and the spine of the creature will function like the one of a snake.
- **Thorax** will look like the one of the Anhima, also keeping the wings similar and making the spur larger to make it a more noticeable feature. (see Appendix G, Fig.4)
- **Lower body** will also be like an Anhima's body, with the snakeskin running on the spine, and from the middle of the Anhima's tail there will be a Coral Snake tail as well popping out.

These are the general concepts that will be used as guidance in the second part, on the modelling of the Bonhima, taking in consideration the research and these early visual representations.



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Cathy Bjork (2015). *HORNED SCREAMER or 'CAMUNGO' (Hysterical bird!)*. [online] [www.youtube.com](https://www.youtube.com/watch?v=eO8jNSdxyqI). Available at: <https://www.youtube.com/watch?v=eO8jNSdxyqI>
[Accessed 30 Nov. 2023].

Jornal da Orla (2022). *Cobra é flagrada vomitando outra cobra após resgate*. [online] [www.youtube.com](https://www.youtube.com/watch?v=QiOwPzkdk-s). Available at: <https://www.youtube.com/watch?v=QiOwPzkdk-s>
[Accessed 30 Nov. 2023].



Appendix A : Mesoamerican Myths

Quatzecóatl is the God of rebirth and renewal, creator and interested in the preservation of life, has different identities throughout Mesoamerica such as the God of the wind or the embodiment of the planet Venus. Quatzecóatl was one of the creators of the sun and the world and his battle with his brother, Tezcatlipoca, represent the opposition between creation and destruction. (Flood, 2013)

His design represents an hybrid between a snake and a bird, is the representation of the union between earth and sky and has deep roots in Mexican culture, so much so that in the Mexican flag there is the depiction of an eagle and a snake, symbol from the Gods to the Aztec people marking the ideal location to found Tenochtitlan, capital of the Aztec Empire.(Smith, 2020)

Sketchfab 3D model: Stone figure of Xiuhcoatl (Fire Serpent)

<https://skfb.ly/BuOq>

This statue of Xiuhcoatl (the fire snake), present at the British Museum, is very readable and has a simple but effective silhouette as it does remind me of a snake coming down of a three branch.

The fire serpent is often represented in Mesoamerican culture, usually with the fire God at the center of the world, Xiuhtecuhtli, or Huitzilopochtli, the Mexica patron God. (The British Museum, 2021)



Appendix B : Coral Snake's Folklore

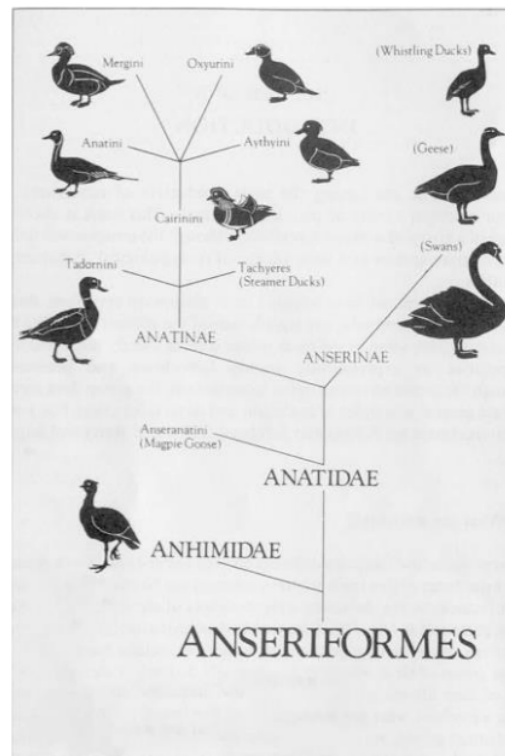
In the Tupi-Guarani cultures knowledge and traditions are also transferred through graphism, a system of patterns present in artefacts that have a symbolic meaning and can be based on beliefs or be more functional, such as working as indication for the best time to gather resources from the forest. (Da Silva, 2015)

Often the patterns found on these artefacts mimic the colour of snakes, and one of the most famous patterns is based on the Coral Snake which is a sign of protection that can be present in baskets, to protect the food that is inside of it, or necklaces and bracelets. (Da Silva, 2015)

Appendix C : Anhimia Genealogy, Anseriformes

Starting from the Anhimia (from Tupi: large bird) cornuta (from Latin: Cornutus - Horned), it is part of the Anhimidae family, a quite small family that includes the Southern Screamer (*Chauna torquata*) and the Northern Screamer (*Chauna chavaria*).

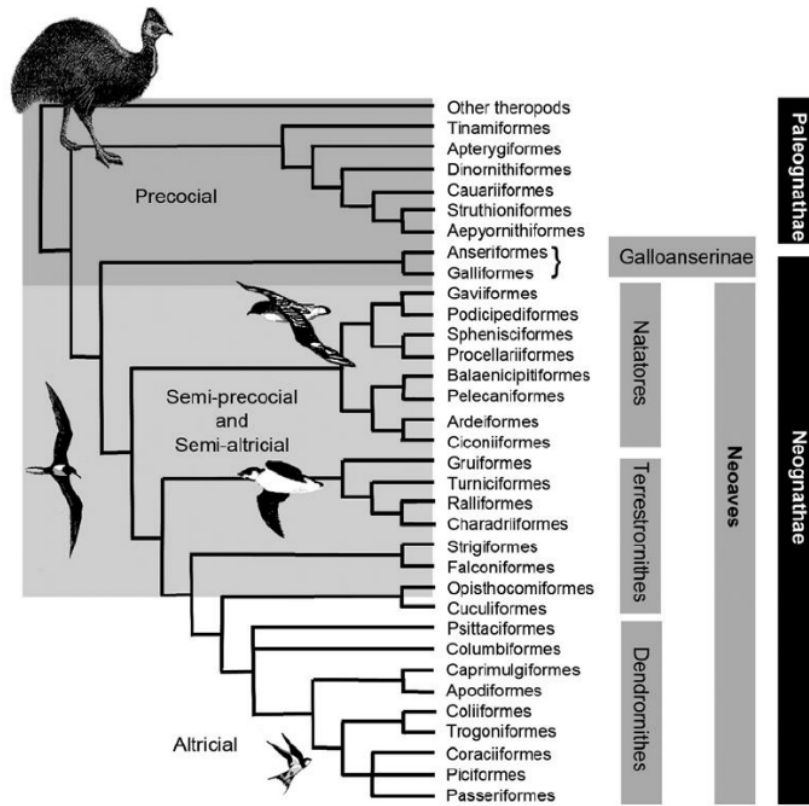
The Anhimidae family is part of the Anseriformes order, close cousins with ducks, geese and swans. They live in wet environments such as lakes, lagoons or swampy riversides.



npcullen (2013). *Anseriformes. Waterfowl Management: The Blog.*

The Anhima is the biggest of the Anhimidae family, weights in average around 3kg and is 80cm tall with a wingspan of 1.7m

The Anseriformes, together with the Galliforms (Ancestors of chickens, turkeys, etc), derived from the Galloanserinae group, the first division of the Neognathae, a direct successor of the Neornithes, the common ancestor of all birds, that appeared in the Early Cretaceous, around one hundred and ten million years ago, making it older than the T-Rex or the Triceraptor. It is hypothesised that this group of dinosaurs survived the great extinction thanks to their habitat, as they lived on riversides or environments with abundance of fresh water. (Eo et al. 2009)



Livezey and Zusi (2006). *Phylogenetic Hypothesis for Relationships Amongst Modern Birds (Neornithes)*. *Cracking a Developmental Constraint: Egg Size and Bird Evolution*.



Appendix D : Coral Snake Video and Venom

I have edited and speeded up a Youtube video where a Coral Snake is hunting, here we can see the techniques of hunting and swallowing prey, inclusive the jaw walking previously described. (REI DAS SERPENTES HAROLDO BAUER, 2019)

Youtube: Coral Snake Hunting Jararaca – Art4D

<https://www.youtube.com/watch?v=Q47m3pV6P08>

These snakes are highly venomous, but they will not attack humans, even if they have the strongest toxin of all South American snakes the cases of accident with humans is very low compared to the Bothrops Jararaca, which is responsible of almost seventy percent of all accidents involving snakes in Brazil. (Buntantan, 2022)

The types of venom that these animals have are extremely varied, as only by looking at the New World coral snakes is possible to identify two distinct families of venom, 3FTx and PLA₂, both with subdivisions. The venom of these snakes is neurotoxic, which means it will affect the communication between the neurons and muscles, death often is attribute to respiratory arrest as the diaphragm stops working. (Correa-Netto et al. 2011)

The Elapids group is monophyletic, which means derived from a common ancestor that probably emerged in Asia less than forty million years ago and is hypothesised that this group entered the Americas through the Bering land bridge that connected the two continents.

²⁶ The New World coral snakes derived from the Sinomicrurus and Calliophis Asian coral snakes and is shown that the New World species had an abnormal rate of specification, more than doubling the clades of other elapids. (Sanz et al. 2019)

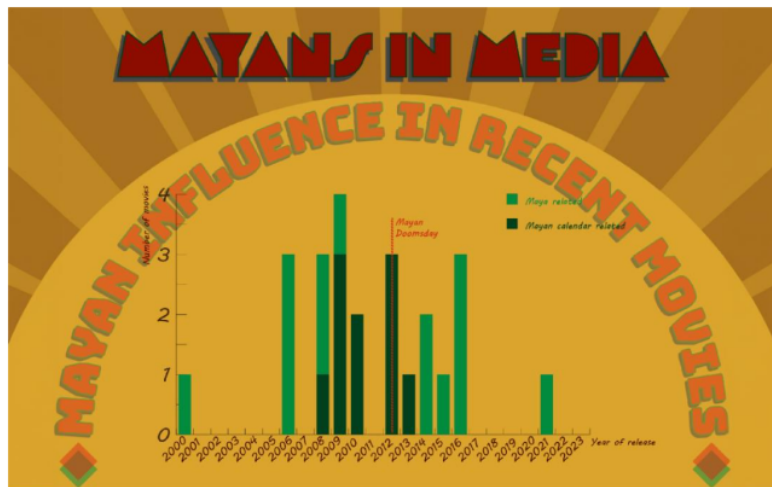


Appendix E : Anhima Musculature

Due to the change in musculature of the bird to assist the use of its bone spurs, its capacity of flight is reduced as these muscles are positioned in a different way compared to its cousins Anatidae. Observations made to *Anhima Cornuta* during flight sustains this hypothesis as it shows limited manoeuvrability when dodging obstacles and difficulties when landing.

The muscles development on the vertebral axis of the *Anhima* shows that these muscles are responsible of sustain the spine during locomotion. Also the thoracic and abdominal muscles are quite developed and complement to the sustainability of the spine. The overdeveloped muscles of these regions occur as an evolutionary response to the loss of the uncinat process (which as consequence has a loss in rigidity of the thoracic cage) and the weight of such big animals (for its species). (Manzanares, 2013)

Appendix F : Mayan Related Movies

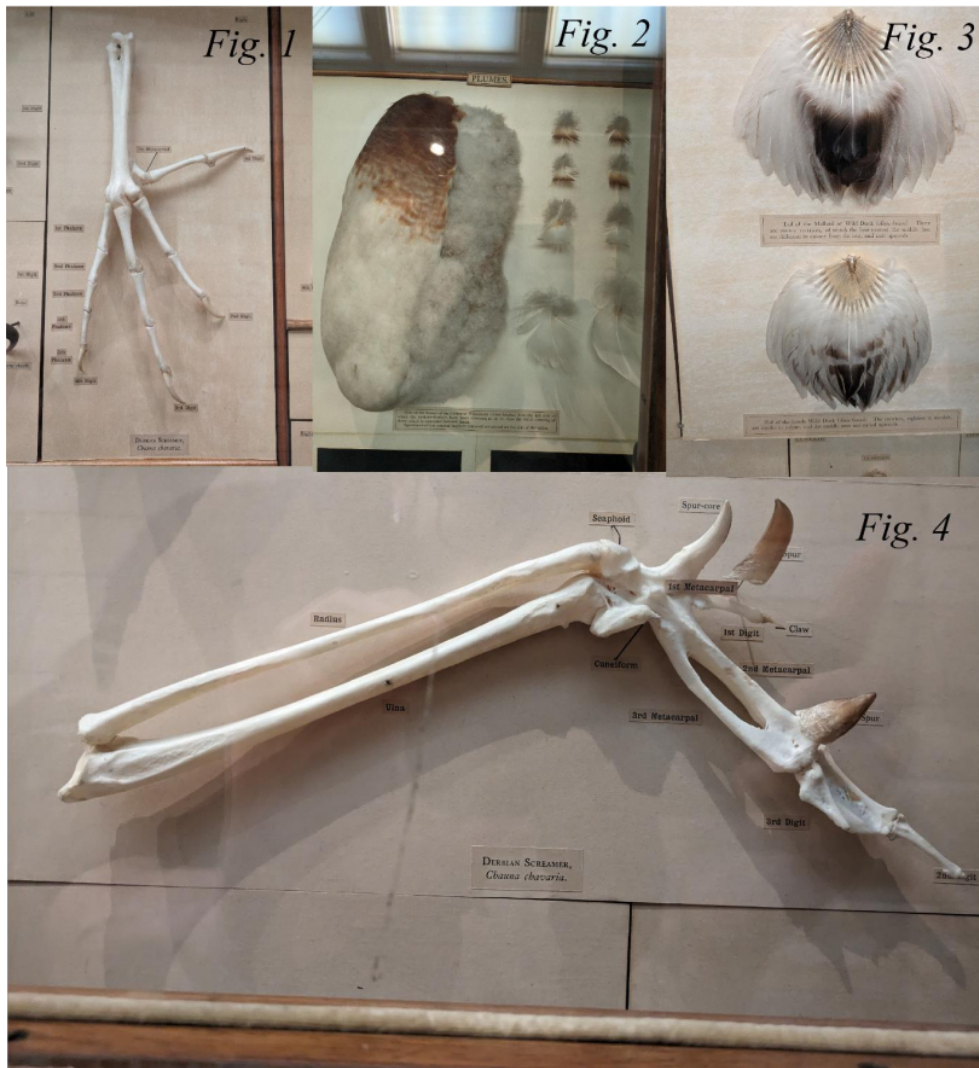


Guidolin, I. (2023) *Mayans in Media*.

Data: IMDb database



Appendix G : Anseriformes Body Parts Resource



Guidolin, I. (2023). *Anseriformes Body Parts*. Natural History Museum, London.



Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11



Fig. 12

Guidolin, I. (2023). *Anseriformes Body Parts*. Natural History Museum, London.



Appendix H : Bonhima's origin story

There was a group of Anhimas isolated in the darkest part of the Amazon basin. Their ancestors were banned by the others from the more adequate habitat for its kind and settled live in a more reclusive area of the Jungle.

Life was arduous for the Anhimas on one of the thousand Amazon River's tributaries, the Andes stand right behind them creating more of a psychological than physical barrier to the horrors of the Jungle.

The only real treat to that small group of antic ducks were the snakes, which numbers seems to be increasing each day almost as Quatzecoatl himself was seminating the Jungle with the serpents.

The group remained small and compact, with the few components still flying to the treetops to alert others of its kind when a serpent was dinning on their nest, as the tradition commands, but knowing that no one will hear them. Their numbers have always remained small due to the voracity of serpents, that even if the Anhimas were able to exterminate in large numbers with their sharp claws and spear-shaped beaks, always a few were able to get to the eggs.

There was a couple of Anhimas who, miraculously, were able to protect all their eggs and their chicks. The others observed them close and notice that they always have a couple of striped and colourful snakes around their nest that did not try to eat their eggs but lived underneath the foliage. Soon the other Anhimas stopped killing the red snakes with black and white stripes, allowing them to settle underneath their nests.

With this new alliance the Anhimas and the Colorful snakes (Coral Snakes) were able to multiply in a few generations spreading throughout the riverside, the increased number of individuals damaged the habitat of other animals of the region reducing their number.



Quatzecoatl was furious that these animals have infringed the delicate balance that he created, as the two amigos are taking more resources and territory in the jungle, most of the other animals are not able to access fresh water in the region and snakes, the favourites out of all his creations, are disappearing faster than the rate he can replace them.

As a punishment for this disequilibrium created, the God of creation cursed all the eggs of both species from that region, generating horrible hybrids between the two animals, which were loud like Anhimas but had the instinct of snakes and ended up devouring their parents soon after birth, as they were already born with fangs, spurs and hunger.

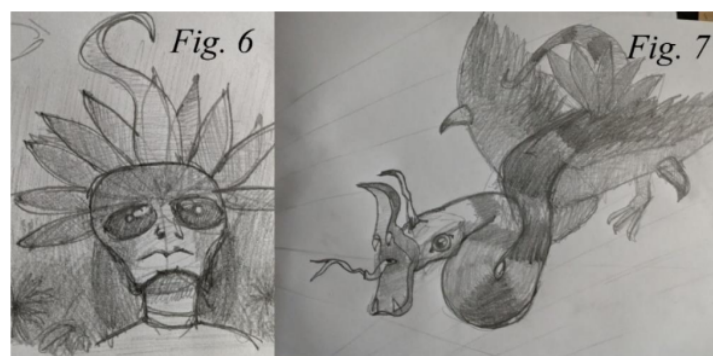
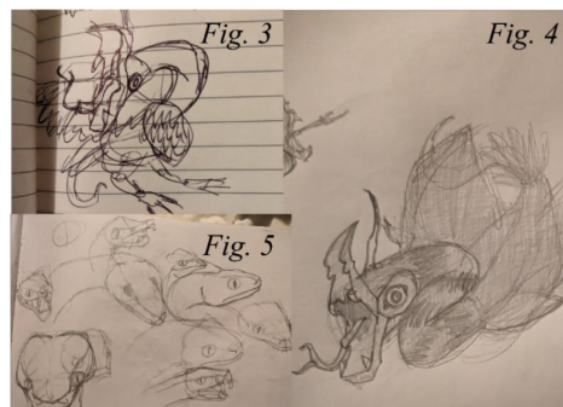
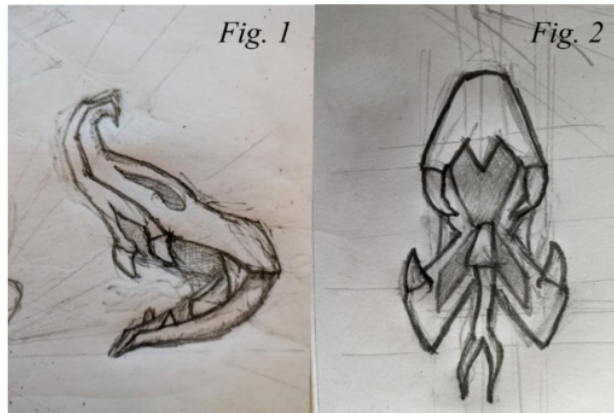
Since then no Anhima or Coral Snake could be seen in that region, and not even other animals, as the voracity of such creatures did not allow for other components of the fauna to thrive.

The natives of the region call these creatures Bonhimas and not even them dare enter their territory, as they are always moving around like they are looking for something or someone, natives affirm they are looking for their other half, as they are still Anhimas and these animals spend their life with a partner, but they will never be able to find it, as even if they find another Bonhima their snake instinct kicks in and they end up fighting until only one survives.

Some aspects of this story were based in Greek mythology such as the myth of Arachne (TED-Ed, 2018) and Mesoamerican mythology (Flood, 2013)



Appendix I : Concept Art



Guidolin, I. (2023). *Concept Art : Bonhima.*



Appendix J : Variations

AS COBRAS-CORAIS DO BRASIL

DESENHOS MARCUS BUONONATO



Buononato, M. (2016). As Cobras Corais do Brasil. Ciencia Brasilis.

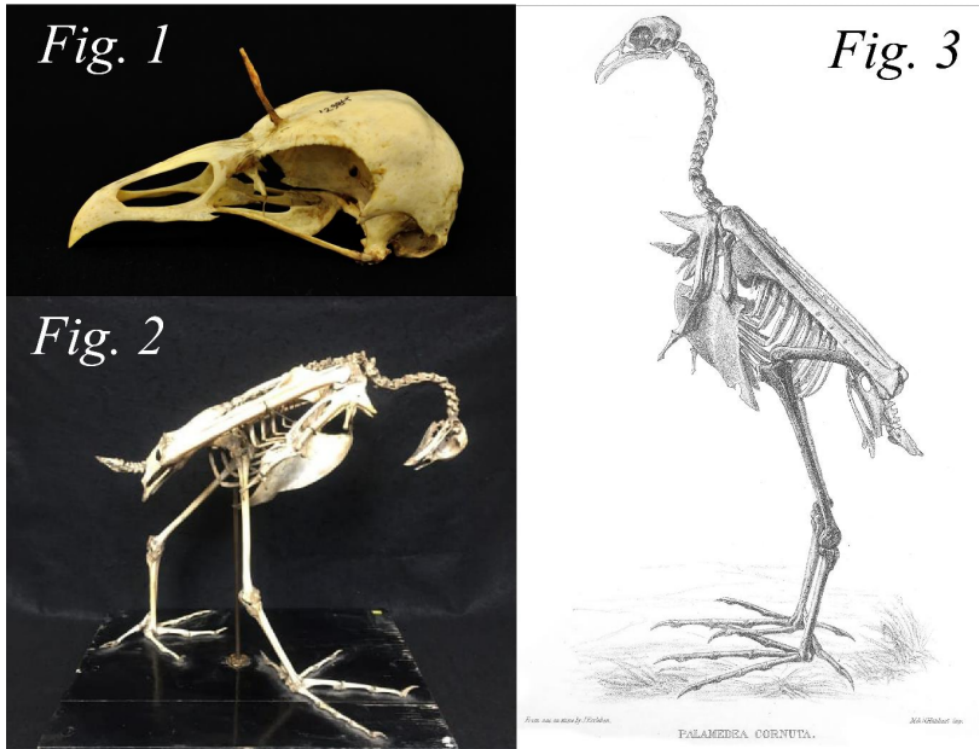


FIG. 2. Variation in the head plumage of the Horned Screamer in Sonso. Drawings were made on the site and are based on close range observations.

Naranjo, L.G. (1986). *Variation in the Head Plumage of the Horned Screamer in Sonso. Aspects of the Biology of the Horned Screamer in Southwestern Colombia.*



Appendix K : Visual Resources



Sengi, C. (2016). *Anhimus Cornutus* cranium. Yale Peabody Museum.

Nadine, G. (2017). *Articulated Skeleton of a Horned Screamer (Anhimus cornutus)*. UCL Culture Blog.

Erxleben, J. (1869). *PalamediaCornutus*Skeleton. Wikimedia Commons.



Ellery, T. (2015). *Horned Screamer - Anhima Cornuta*. birdguides.com.

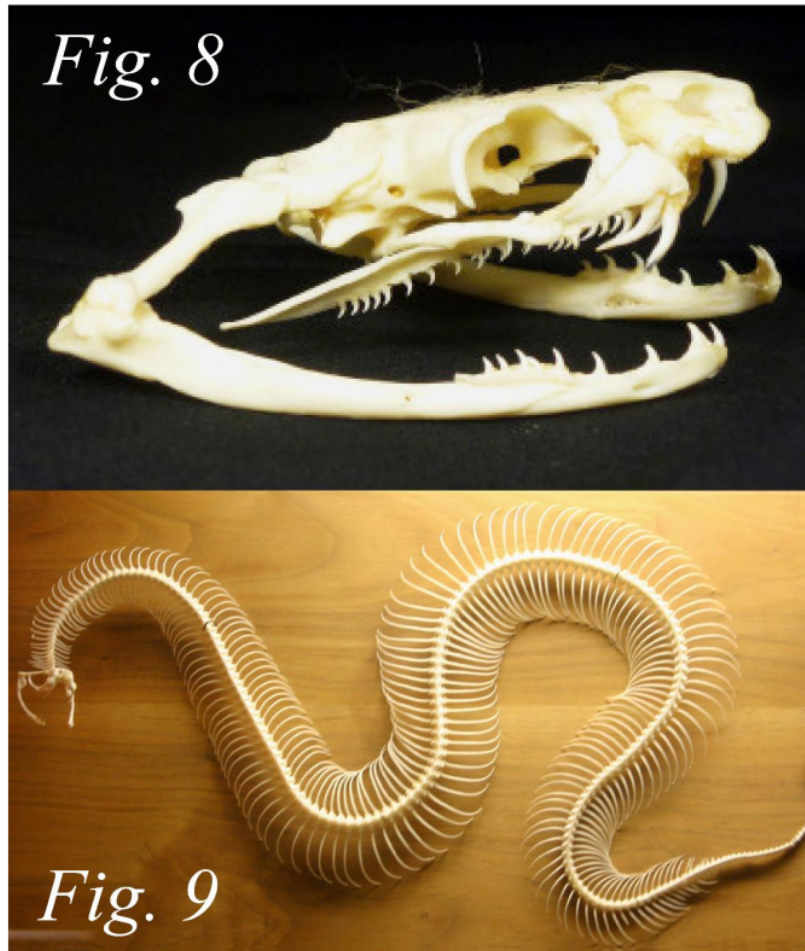
Birdwatcher Brasil (2023). *Horned Screamer (Anhima Cornuta)*. peruaves.org.

Harteman, J. (2023). ⁹ *Horned screamer, at Criadouro Poços de Caldas, Minas Gerais, Brazil*. harteman.nl.

Tony (tickspics) (2017). *Horned Screamer*. flickr.com.

Anhima downloadable mp3 calls at peruaves.org:

<https://www.peruaves.org/anhimidae/horned-screamer-anhima-cornuta/>



14
Yamakawa, Y. (2013). *Dentition of the Cape Cobra (Naja nivea). Note the Replacement fangs.* : *Handbook of Proteolytic Enzymes (Third Edition)*.

dbking (2006). *Snake Skeleton*. *Wikimedia Commons*.

Bonhima Jungle's Cursed Snake-Duck

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