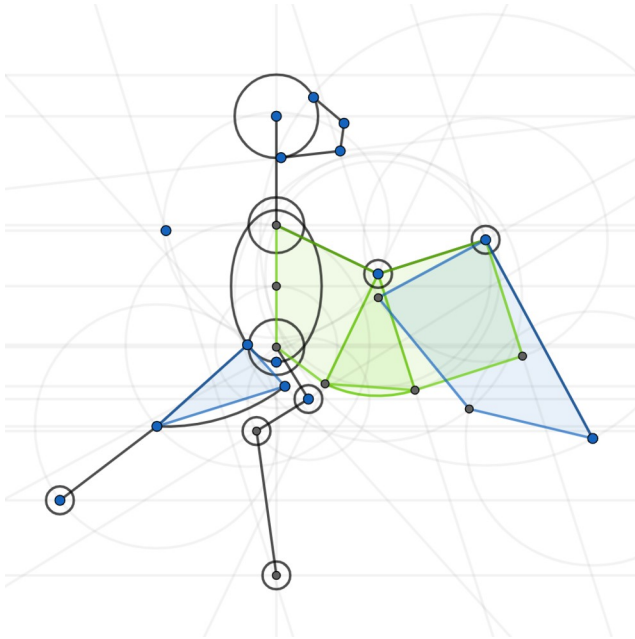


The Bionyr Biology

by Primonyr



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Preface

I am Kris “Primonyr”, I'm a French intern engineer in images and models for the planning and assistance to surgery and therapy who loves to daydream and joke around. I like science, medicine, heraldry and other medieval themes.

This biology booklet is the first stone of a big project I've had in mind for years, the Onyr world. My goal is to describe the world and its features in depth and make it available for everyone to explore and imagine stories. Since this world revolves around its dominant species, the bionyr, it's only logical to start by examining them.

The bionyr is built with two concepts in mind :

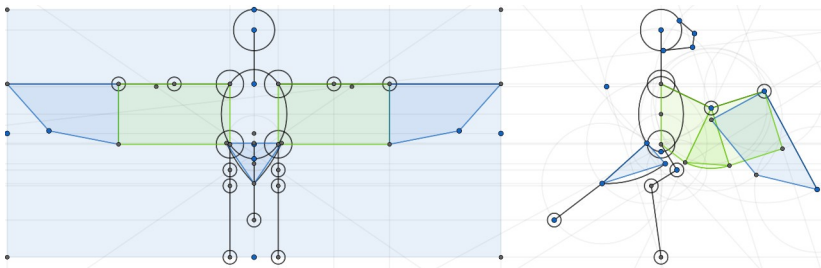
Realism, the bionyr obeys to the laws of physics and biology, therefore its body features and lifestyle must be coherent, functional and adapted to its environment.

Diversity, every individual looks and behaves different from an other, giving artistic freedom to readers.

Unlike with closed species, everyone is free to create a character from this one, following this booklet or just part of it, having their own view on the bionyr.

Part 1 : A tale of flesh and bones

1.1. An overview of the body shape



“The Bionyr of Vitruve” available in higher resolution [here](#)

The bionyr is a bipedal owl featuring a large gyroscopic head with antennae, forward facing eyes and a beak, a mix of avian and primate arms with hands with extensions to support large elliptical feathery wings, avian legs and a flat feathery tail. While very intelligent and surprisingly dexterous, their body is highly constrained to allow flight.

It is a relatively small creature compared to its environment, having an average height of 90cm and a wingspan of 180cm.

Such a small body is perfectly adapted to its environment. First, in hiding from predators in trees. Then, it requires less food than a bigger creature. Finally, it helps a lot

with mobility and agility in the skies as well as on land, especially in the woods when moving from tree to tree.

1.2.1. A structural study, the skeleton

MISSING DOCUMENT vitruve skeleton version

To keep rigidity in flight, a solid fused spine is needed, which results in a decreased agility on land. It is however still segmented and flexible for the neck and the tail. The upper limbs are a mix of primate and avian, having an extension bone connected to the wrist the same way a thumb is to support the wing, allowing it to fold and give space to a dexterous five fingers hand. The lower limbs are analogous to avian ones with three strong talons, forming a Y shaped claw.

Most of bionyr bones look like hollow tubes of calcium construction. Such structure save some weight while keeping a decent integrity. However, they are quite fragile.

1.2.2. A structural study, the muscles

MISSING DOCUMENT vitruve muscles version

Compared to the light bone structure, the musculature of the bionyr is relatively strong, especially the back and pectoral muscles, to allow durable flight. Leg and neck muscles too are powerful to cushion landing impacts and avoid brain damage. However, due to the rigid spine, the abdominal musculature was no longer needed and became vestigial. To tilt the body backwards or inwards, bionyrs rely on their legs. They can't however tilt their body sideways or twist it. Instead, they use their flexible neck, able to rotate 180°, to look around.

1.3. Foci

1.3.1. Focus on the hand

MISSING DOCUMENT hand crop from virtuve

The bionyr has a complex four fingers hands, including a thumb. Each finger has one metacarpal bone and three phalanxes except the thumb that only has two. The association of the thumb and the fingers makes a prehensile and dexterous hand. There are small but solid keratin claws at the end of each finger to help the bionyr climb trees, peel and crack open fruits and hold on slippery fish. If needed they can also help in fights. Like felids, bionyrs resharpen they claws by scratching trees.

Technically speaking, the extension bone for wing support is attached to the hand to the carpal bones and could be considered as a fused fifth digit. It however isn't used for tasks requiring dexterity as it has a limited movement capacity, being only able to fold on the arm.

1.3.2. Focus on the wing

MISSING DOCUMENT crop wing

bionyr forelimbs are very similar to primate arms to which is attached a tapering extension bone to the hand, holding the primary feathers. It can fold on the arm to make the wing less cumbersome and allow the use of the hand. Like with avian wings, the secondaries are held by the ulna and the tertials by the humerus.

These wings are of an elliptical shape for agility and maneuverability, useful to navigate in forests. They also do not need a run up to take off and coupled with the powerful leg muscles, bionyrs can quickly get out of predators' reach. However, they are not very well adapted to sustained flight as they require intensive flapping to stay in the air. This is somewhat counterbalanced by the strong shoulder muscles. On average, a bionyr can fly for about an hour straight and can reach 70 km.h^{-1} on low altitudes (100m above the ground). They rarely go in high altitudes because of strong winds making flight control difficult and the low dioxygen concentration not mixing well with the high demand of the body.

It is interesting to note that the wings are, alongside the tail feathers, usually the most colorful part of the body as they can cover the whole color spectrum with pretty much any arrangement imaginable.

1.3.3. Focus on the head

MISSING DOCUMENT vitruve head

What probably stands out the most are the twig shaped antennae that look like thin antlers, used for communication between individuals. See more about them on how they work on part three.

While they do not provide a wide field of view, bionyrs eyes can detect a large range of colors thanks to their three different kind of cones (red, green and blue) in high number and density, permitting a precise vision, even at long distance with their powerful lenses. However, due to the high number of cones, there are relatively few rods on the retina, resulting in a reduced vision in dark places and at night or dusk. As such, bionyrs are more adapted to live during the day.

The lightweight beak is made of keratin in a way that makes it particularly sharp to allow the bionyr to cut their food if they can't swallow it whole. It also continuously grows to compensate for the wear. bionyrs use their tongue to gauge the sharpness of their beak and can sharpen them with their claws if needed.

Nasal and auricular cavities are small and underdeveloped, meaning bionyrs have poor senses of smell and hearing.

A gyroscopic head prevents it from shaking, allowing a stabilized vision during flight.

While its shape isn't very aerodynamic, the skull leaves a lot of space for a relatively big brain.

1.3.4. Focus on the leg

MISSING DOCUMENT crop talon

bionyrs are digitigrade creatures with muscular thighs and feet similar to avian ones, having three strong fingers forming a Y to walk on land but also in trees thanks to their prehensile nature. These fingers are composed of a metacarpal bone, two phalanxes and a large claw. These talons can be planted in trees to climb them, used when dive fishing to hold on preys, or as decent weapons to use in case of a fight, especially in flight. Just like their hand counterparts, they can be resharpened by scratching trees.

1.3.5. Focus on the tail

MISSING DOCUMENT tail

The flat feathery tail can be deployed to create rear lift and twisted for control in flight.

Like their wing counterparts, tail feathers are very colorful and diverse.

1.4. Intraspecies variations

1.4.1. Sexual dimorphism

MISSING DOCUMENT male and female

There is actually a few physical differences between males and females. Initially, that is. Females feature slightly larger hips to ease egg laying though.

However, when females get pregnant, their bodies undergo some changes. First, since expecting females don't move a lot and need more energy, their fur grows longer and denser to protect them, their eggs and their offspring from the weather. It also helps in hiding babies from predators. A few months after labor, the fur sheds and reverts back to normal.

1.4.1. More variations

MISSING DOCUMENT different bionyrs

There is a lot of diversity within the bionyr kind. First, in the wings and tail feathers colors and patterns. We would think evolution would lead to patterns favoring dissimulation, but surprisingly, almost any color pattern imaginable is possible, may it contain the full color spectrum or just some minimalist geometric shapes and lines. Bionyrs seem to love their colored feathers and often use them as a mean of self expression, sometimes using dyes. However, the body is generally mono or bichromatic and around white, black, grey, brown and tan hues with sometimes additional markings, but nothing complex.

Then, there are the variations in sizes, the values given in the overview section are averages so it is possible to find individuals that are taller or smaller. However the proportions themselves are generally the same.

Part 2 : An organic machine

2.1. A command unit, the brain

Missing document : brain map

The bionyr brain can be divided in nine zones :

The frontal partition, or the orator, is in charge of the language. It fetches words stored by function from the dictionary to form sentences. They are then either sent to the motor, or to the transmitter to be pronounced. Note that there is a different dictionary for each kind of communication.

The frontal ring partition, or the motor, is directly in command of all the muscles.

The back ring partition, or the primary sensor, computes information coming from the muscles. It provides a proprioception (knowing the body position) and serves as a loop to return data to the motor to adjust its commands.

The upper partition, or the secondary sensor, receives information from the skin for the sense of touch, the tongue for the taste, the nasal cavity for the smell, the aural one for hearing and the gyroscope for balance.

The bottom partition, or the memory, stores sensory information and all kind of ideas. This partition is also

responsible of the imagination, thoughts, reasoning and emotions. It therefore works closely with the orator.

The arc partition, or the transmitter, manages the antennae. It generates electromagnetic signals from the information it gets and also converts received signals into information.

The back partition, or the scope, interprets the signals from the retinae to create images, allowing vision. It also has a shape recognition system, able to recognize faces and fruits for example.

The primitive is responsible for the primal needs like thirst and hunger, as well as instincts and reflexes.

The central partition, or the web, connects the other areas together with billions of links so they can work together

2.2. A supply chain, the blood system

2.2.1. A pump, the heart

Missing document : blood cycle, heart

The heart is composed of three parts, the pulmonary, the renal and the systemic, each one divided in three subparts, input, cavity and output.

The heart serves as a pump to make the blood flow through the body. First, by contracting, it sends O_2 rich blood from the rich cavity to the organs through the arteries. The O_2 poor and CO_2 rich blood is then sucked back through the veins to the heart into the poor cavity when it expands. The next contraction, this blood is sent to the lungs, where red cells exchange their CO_2 for O_2 . Finally, when the heart expands again, the O_2 rich blood comes back into the rich cavity.

2.2.2. An exchange zone, the lungs

Missing document : lungs, diaphragm and ribcage lift

To fill the lungs with O_2 rich air, muscles lift the ribcage and the diaphragm contracts to increase its volume. After the exchange, to eject the CO_2 rich air, the ribcage is lowered and the diaphragm expands back.

2.2.3. A filter, the kidneys

missing document : kidneys

lorem ipsum

Roadmap

Part 2 : An organic machine

- 2.1. A command unit, the brain
- 2.2. A supply chain, the blood cycle
 - The heart
 - The kidneys
 - The lungs
- 2.3. A nutrition system, diet and digestion
 - 2.3.1. The diet
 - 2.3.2. The digestion
 - The stomach
 - The intestines
 - The liver
- 2.4. A protection organization, the immune system
 - The lymph
 - The leukocytes
- 2.5. Species sustainability, the reproductive system
 - 2.5.1. The reproductive organs
 - 2.5.2. Pregnancy

Part 3 : A social being

- 3.1 INDEV