Feathers, Fame, and Fabulousness:

EAZA Crowned-Pigeon Education and Awareness Guidelines

Western crowned-pigeon version

EUROPEAN ASSOCIATION OF ZOOS AND AQUARIA
EAZA

EEP

EAZA PIGEON & DOVE TAG

BUDAPEST ZOO

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P&D TAG Mission statement and our goal

EAZA Pigeon and Dove TAG mission statement: "To establish and maintain diverse and sustainable ex situ populations of columbids and facilitate support for in situ conservation of threatened pigeon & dove species through collaboration and research with all relevant stakeholders in all regions. "

To reach this goal we created a series of initiatives that aim to:

- Provide ideas and information to improve crowned-pigeon specific environmental education in zoos.
- Increase awareness about crowned-pigeons in the general public and within the zoo world.
- Increase knowledge, awareness and commitment to do action within and beyond the zoo community.
- Promoting collaboration between different ex-situ experts, stakeholders.
- Challenging the status quo of popular flagship species.
- Bringing clarity of functions of modern zoos, such as education.

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Introducing crowned-pigeons

Crowned-pigeons are the largest pigeons in the world. With their impressive size, beautiful blue colour, unique lace-like crown, and gentle nature, they quickly win people's hearts. Despite their record size and distinctive blue appearance, not many people know about them. Still, by reading the following material, anyone can become an expert on these beautiful birds.

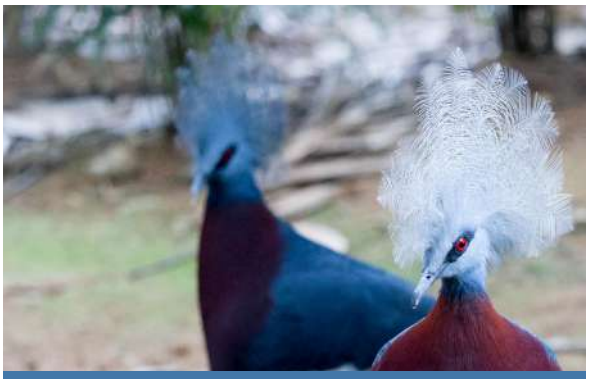
Let's get to know the gorillas of the pigeon world, the crowned-pigeons!

Currently, we know of four species of crowned-pigeons:

Western crowned-pigeon
(Goura cristata)

Victoria crowned-pigeon
(Goura victoria)

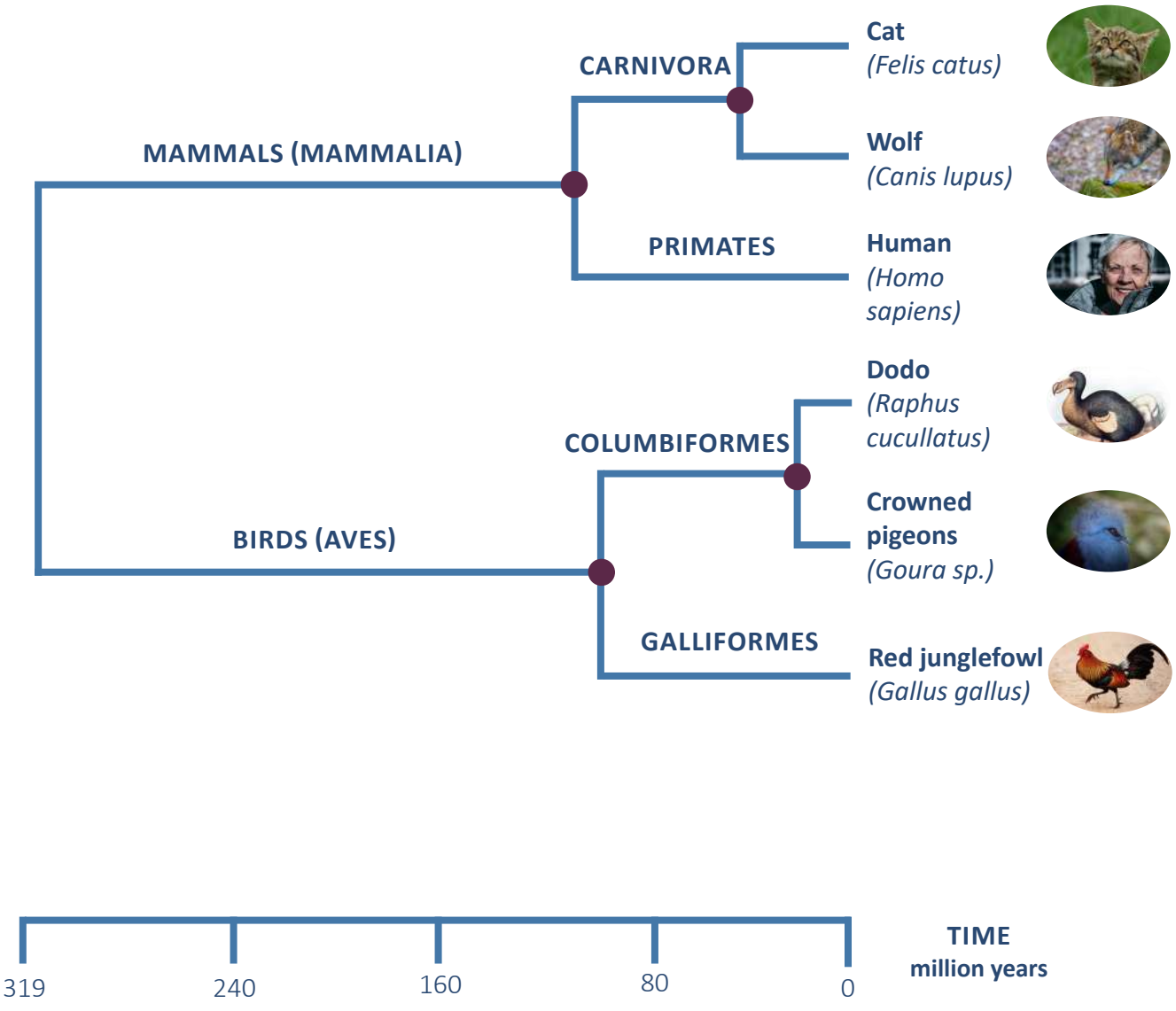
Sclater's crowned-pigeon
(Goura sclaterii)



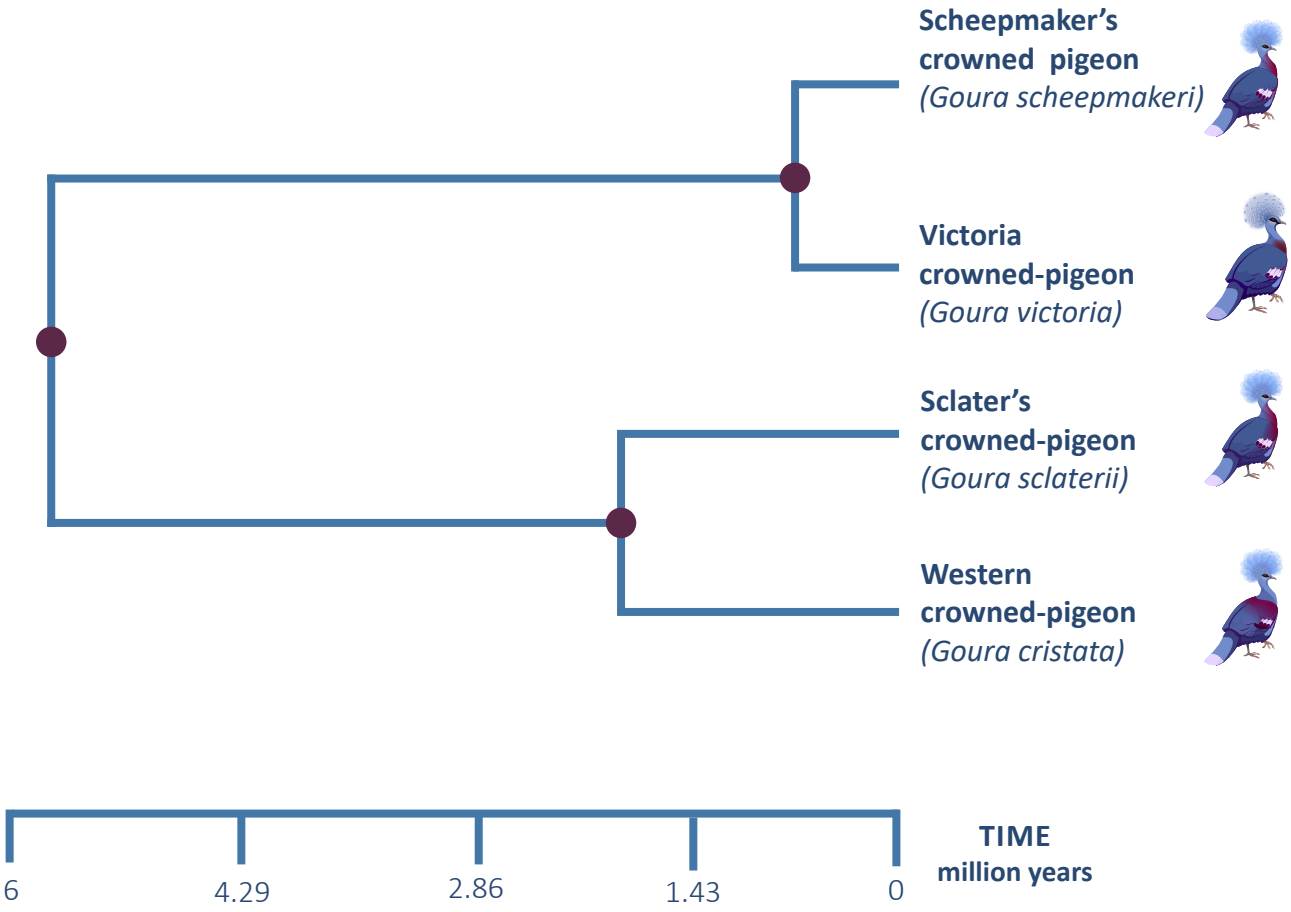
Scheepmaker's crowned-pigeon
(Goura scheepmakeri)

The genus Goura was introduced to the public by the English naturalist James Francis Stephens in 1819. Interestingly, this was the year Queen Victoria was born and the kick scooter was invented. The name Goura, unsurprisingly, means crowned-pigeon in the language of one of the indigenous tribes on the island of New Guinea.

All four pigeon species live on the island of New Guinea. In the course of evolution, they separated from the dodo 31 million years ago, from the red junglefowl, the ancestor of the domestic chicken, 91 million years ago, and from humans 319 million years ago.



The four crowned-pigeon species diverged from each other approximately 5.73 million years ago. For a long time, there was no consensus on whether there were three or four species of crowned-pigeons. Many experts considered the Sclater's crowned-pigeon to be a subspecies of the Scheepmaker's crowned-pigeon. However, a 2018 genetic study not only proved that they belong to separate species but also that the Sclater's crowned-pigeon is more closely related to the Western crowned-pigeon, while the Scheepmaker's crowned-pigeon is more closely related to the Victoria crowned-pigeon.



DID YOU KNOW THAT...?

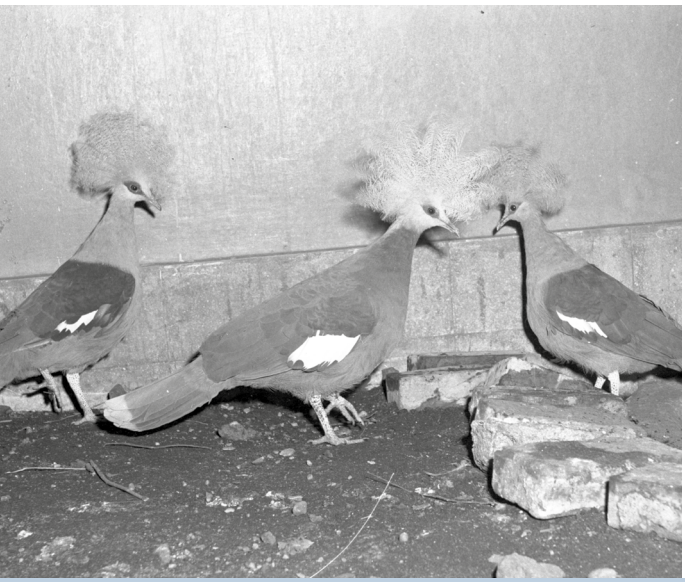
With a body length of 74 cm (29 inches) and a weight of up to 2.4 kg (5.5 pounds), the Victoria crowned-pigeon is the largest living pigeon species today.

Hybridization

All four species of crowned-pigeons are closely related enough evolutionarily to hybridise. This can occur both in the wild and in captivity.
Interestingly, in the wild, this does not occur between the Sclater's crowned-pigeon and the Scheepmaker's crowned-pigeon, which share part of their range of distribution, but between the Western crowned-pigeon and the Victoria crowned-pigeon, whose ranges only overlap in a very small area. This is particularly interesting from an evolutionary perspective, as the Sclater's crowned-pigeon is most closely related to the Western crowned-pigeon, while the Scheepmaker's crowned-pigeon is more closely related to the Victoria crowned-pigeon.

Victoria crowned-pigeon and Western crowned-pigeon hybrid

Western crowned-pigeon and Sclater's crowned-pigeon hybrid



In the past, hybridisation also occurred in zoos when there was less emphasis on breeding only on the species level and different species of crowned-pigeons were kept in the same aviary and allowed to form pairs. Nowadays, this is no longer common. Modern zoos emphasise preventing this, and they keep not only all species separate but any potential hybrid in different enclosures.

Western and Sclater's crowned-pigeons in the same enclosure around 1970

A LITTLE BIT OF HISTORY

WESTERN CROWNED-PIGEON

Western crowned-pigeon illustration from the collection of University of Amsterdam, 1700-1880

The species was described by Peter Simon Pallas in 1764, initially as *Columba cristata*. Interesting fact that during the same year, the world saw one of the largest tornadoes in written history, which struck the town of Woldegk in Germany.

Three subspecies of the Western crowned-pigeon are distinguished: *cristata, minor*, and *pygmaea*, although the number of subspecies is questionable.

VICTORIA CROWNED-PIGEON

Victoria crowned-pigeon illustration from the collection of University of Amsterdam, 1700-1880

The species was described by British zoologist Louis Fraser in 1844 and named *victoria* in honour of Queen Victoria. Interestingly, the same year saw the extinction of a species, with the last officially recognised pair of great auks being killed. Currently, the Victoria crowned-pigeon subspecies are distinguished: *beccarii* and *victoria*. The *victoria* subspecies is smaller and has darker plumage, living on the islands of Yapen, Biak, and Supiori. It was from this subspecies that the species was described. The *beccarii* subspecies is found only on the main island of New Guinea. It is slightly larger, has a denser crown, and has its white lace-like ending that is also more prominent in their case.

Sclater's crowned-pigeon

For a time, it was considered a subspecies of the Scheepmaker's crowned-pigeon, but according to a 2018 genetic study, it is a distinct species that is more closely related to the Western crowned-pigeon. The species was originally described by Tommaso Salvadori in 1876, and he named it in honour of the English ornithologist Philip Sclater. Interestingly, the same year the world's first telephone call was made by Alexander Graham Bell, which could have been about the news of the species' description, but instead, the famous words were: *„Mr. Watson, come here, I want to see you."*

Currently, two subspecies of the Sclater's crowned-pigeon are distinguished: *sclaterii* and *wadai*, although the validity of these subspecies is questionable.

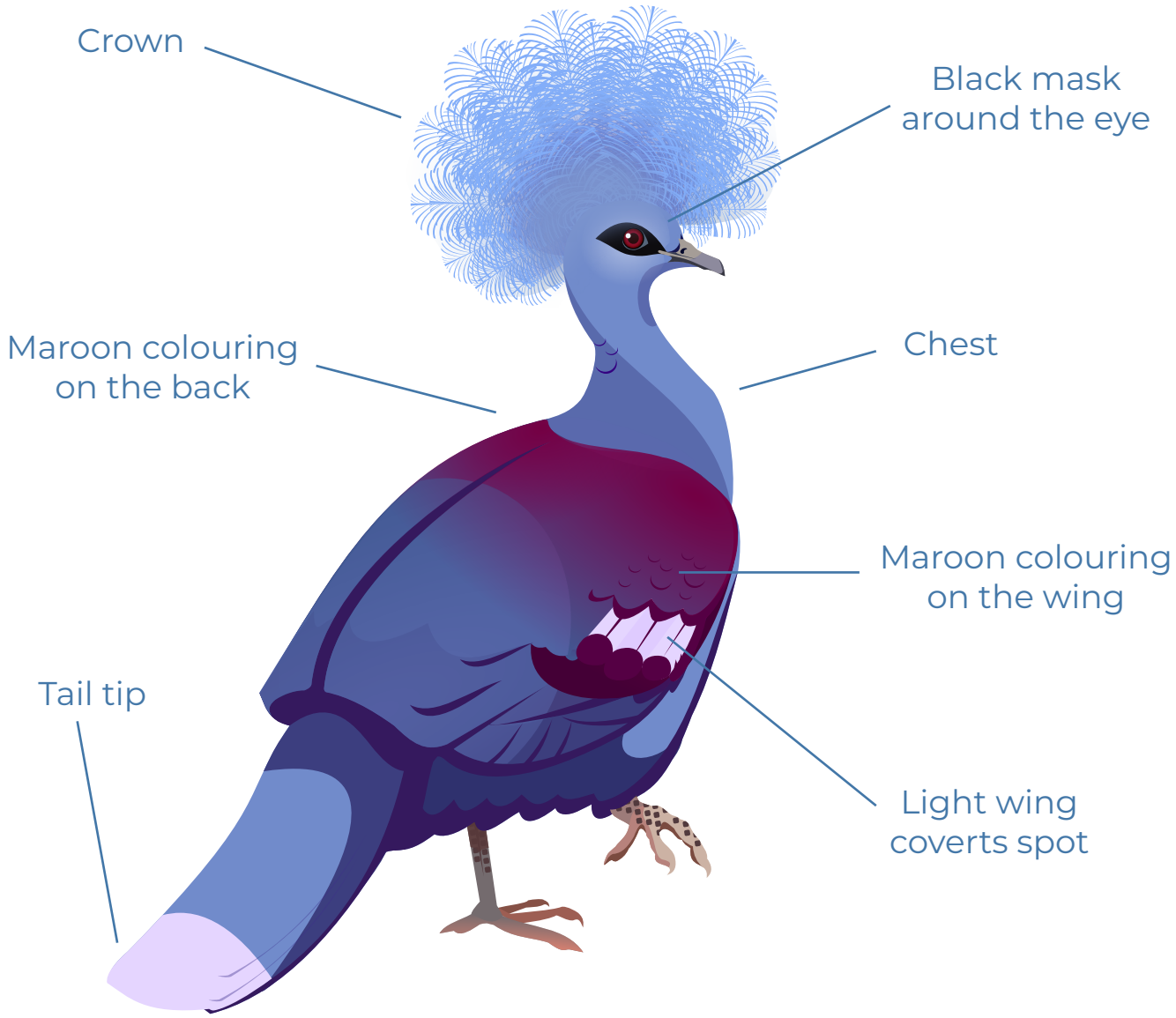
Scheepmaker's crowned-pigeon

For a time, it was thought to be the same species or possibly a subspecies of the Sclater's crowned-pigeon, but as previously mentioned, this view was overturned in 2018. The species was named by German zoologist Friedrich Hermann Otto Finsch, also in 1876, who obtained a Scheepmaker's crowned-pigeon from a bird dealer named C. Scheepmaker at the Amsterdam Zoo. Interesting fact, that the same year Johannes Brahms had the premiere of his long-awaited first symphony.

Scheepmakeri's crowned-pigeon illustration from 1875 by Otto Finsch & Joseph Smit

What do crowned-pigeons look like?

All species of crowned-pigeons are characterised by being the largest among pigeons. From the top of their head to the tip of their tail, they are about 70 cm (27.5 inches) long. The largest is the Victoria crowned-pigeon at 74 cm (29 inches), while the other three species are approximately 70 cm long (27.5 inches). Their weight ranges between 1.8 and 2.4 kg (4-5.5 pounds). For comparison, an average cat weighs 5 kg (11 pounds), so although these pigeons may look larger than a domestic cat, due to their plumage, they weigh only half as much.

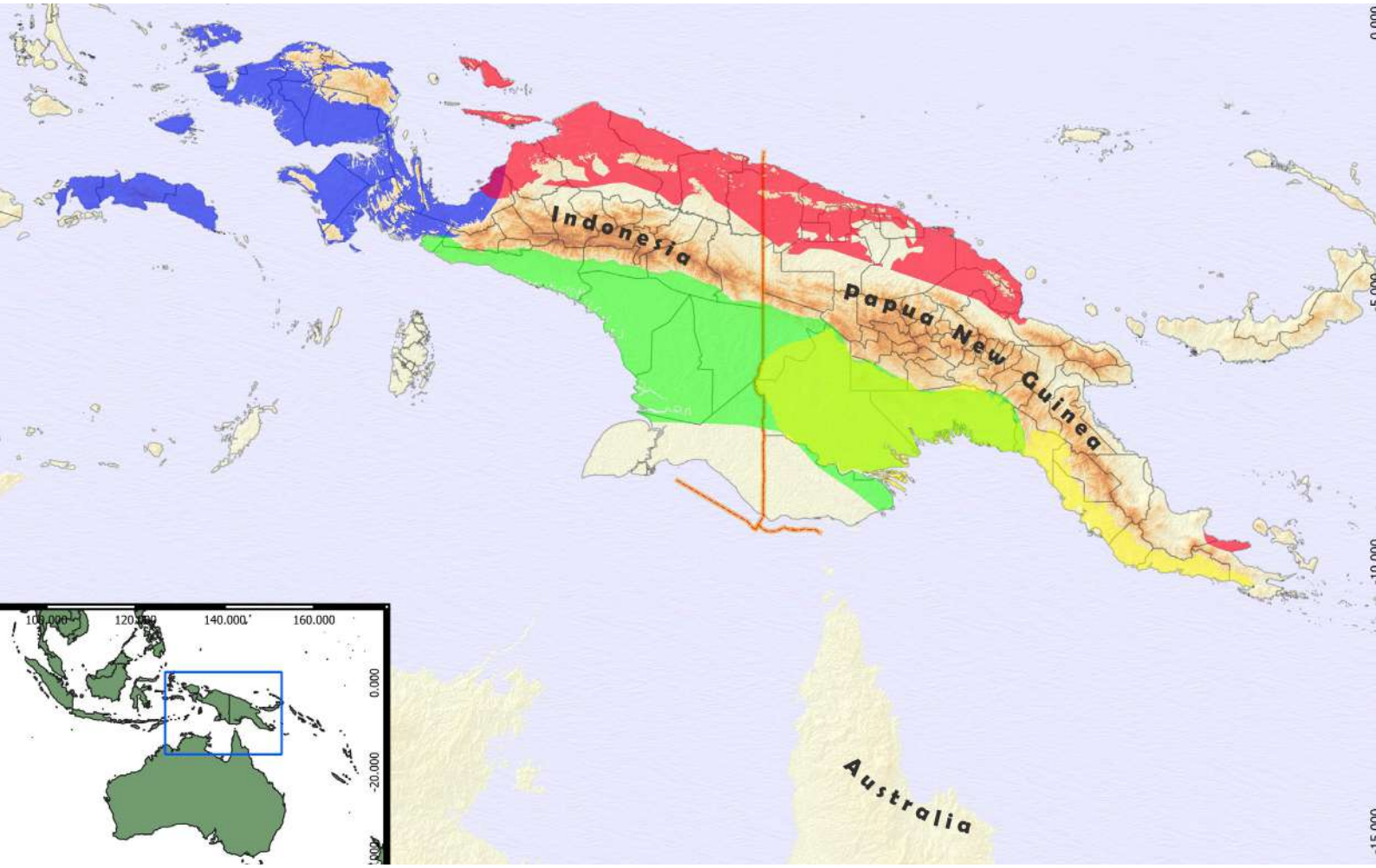


Also true, that blue is the dominant colour in the plumage of all species. Although they may look almost identical to the untrained eye, the species can be easily distinguished with a little more attention. Let's take a look at the characteristics worth observing for this purpose.

	Western crowned-pigeon	Victoria crowned-pigeon	Sclater's crowned-pigeon	Scheepmaker's crowned-pigeon
Scientific name	*Goura cristata*	*Goura victoria*	*Goura sclaterii*	*Goura scheepmakeri*
Crown	blue	blue, with white spatula-shaped endings	blue	blue
Chest	blue	maroon, running up to the top of the chest	maroon, running up to the upper part of the neck	maroon, running up to the lower part of the neck
Maroon colouring on the back	connected on the back	not connected on the back	not connected on the back	not connected on the back
Maroon colouring on the wing	yes	no	yes	no
Black mask around the eye	almond-shaped	almond-shaped, but runs under the chin	almond-shaped	almond-shaped
Light wing coverts spot	white, the smallest among the species	light blue, greyish, larger than the Western crowned-pigeon	white, larger than the Western crowned-pigeon	white, larger than the Western crowned-pigeon
Tail tip	white	grey	white	white

Distribution

All four species of crowned-pigeons live in Asia, in New Guinea, located north of Australia, and on some surrounding smaller islands. Their distribution area is shared by two countries: Indonesia and Papua New Guinea.



Western crowned-pigeon
Goura cristata

Sclater's crowned-pigeon
Goura sclaterii

Victoria crowned-pigeon
Goura victoria

Scheepmaker's crowned-pigeon
Goura scheepmakeri

Western crowned-pigeon

As its name suggests, the Western crowned-pigeon lives in the western part of New Guinea, in the Indonesian territory, marked in blue on the map. Their distribution area is approximately 217,000 km² (83,784 mi²), which is about 2.5 times the size of the island of Ireland, shared by Ireland and Northern Ireland. To put it another way, this area could fit 55 billion double mattresses. Most of this area comprises the Bird's Head Peninsula (Vogelkop), but it also includes the West Papuan islands such as Misool, Waigeo, Salawati, and Batanta. Additionally, they are found in the lower areas east of the Bird's Head Peninsula.

Their distribution overlaps with that of the Victoria crowned-pigeon on the Bird's Head Peninsula at the tip of Cenderawasih Bay near the Siriwo River, where natural hybridisation of the two species occurs.

Victoria crowned-pigeon

The Victoria crowned-pigeon is found in the northern part of the island of New Guinea, in both Indonesia and Papua New Guinea (marked in red on the map). Their distribution area is 477,000 km² (184,170 mi²), which would require 1.5 billion IMAX screens to cover, or 5.5 times the size of the island of Ireland if we stick to the previous example.

These birds live from Geelvinck Bay in the northwest of the island to Astrolabe Bay in the east, mainly in the Sepik and Mamberamo basins, but a smaller population is also found in one of the easternmost parts of New Guinea, around Collingwood Bay. As seen with the distribution of the Western crowned-pigeon, their range overlaps with that of the other species in the western part of the island.

Sclater's crowned-pigeon

The Sclater's crowned-pigeon (marked in green on the map) is native to the southwestern part of the island. Its distribution starts from Etna Bay in the west and is likely bordered by the Fly River in the east, though this is disputed. This species is spread over an area of approximately 257,000 km² (99,228 mi²), which is equivalent to 3 times the size of the island of Ireland (or 600,000 times larger than Vatican City). Part of its area overlaps with the distribution of the Scheepmaker's crowned-pigeon, but interestingly, it is more closely related to the Western crowned-pigeon.

Scheepmaker's crowned-pigeon

This species lives in the eastern part of the island of New Guinea (marked in yellow on the map). Its distribution area is approximately 74,800 km² (28,880 mi²), which is just shy of the size of the island of Ireland but slightly larger than the Republic of Ireland itself. To cover such an area, 70 billion beach towels would be needed. The western boundary of its distribution is unclear and could be anywhere where its range likely overlaps with that of the Sclater's crowned-pigeon between the Fly and Purari Rivers. Moving eastward, it is found in almost all the low-lying areas in the southeast of New Guinea, all the way to Orangerie Bay.

Habitat

Western crowned-pigeon

Prefers undisturbed lowland and hill rainforests, swampy and temporarily flooded areas, and mangrove forests. It is not found at high altitudes, it occurs up to 350 meters (1,150 ft) high elevations.

Victoria crowned-pigeon

Likes dense lowland forests, secondary forests, swampy and dry areas, and sago palm forests. However, it is not found in areas where the forest remains only in patches. It can be found up to 600 meters (1,970 ft).

Sclater's crowned-pigeon

This species also prefers undisturbed lowland forests. It is present up to an elevation of 500 meters (1,640 ft).

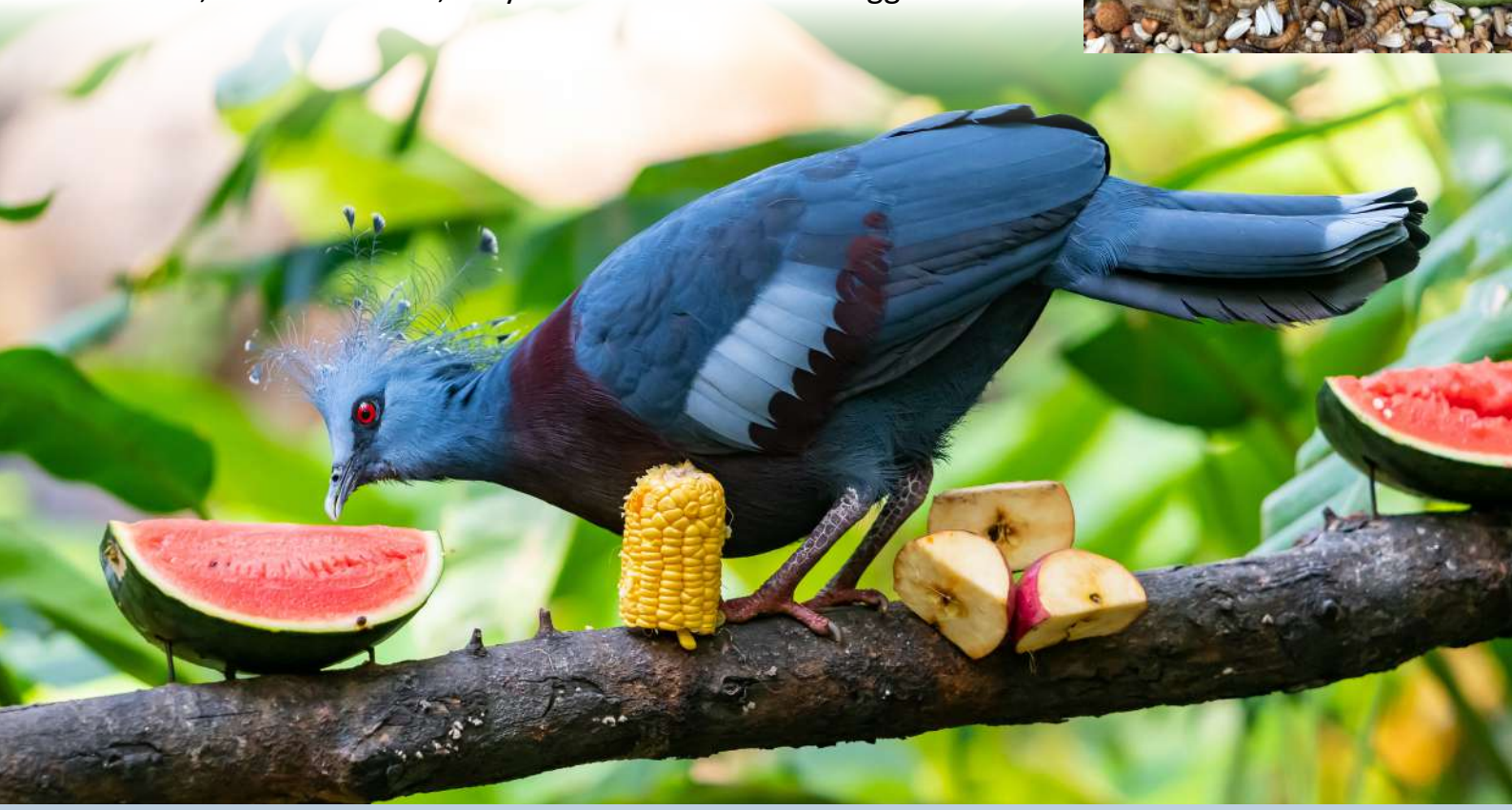
Scheepmaker's crowned-pigeon

Like the other species, it prefers undisturbed, dense, lowland forests, which can be either dry or swampy. This species has been encountered at elevations of up to 800 meters (2,620 ft), and it is not excluded that it may occur even higher.

What do crowned-pigeons eat?

All species are characterised by searching for food on the ground, consisting of seeds, plant parts, and fruits, supplemented with arthropods. They usually feed in groups of 2-10 individuals. The Western crowned-pigeon has been observed in the smallest groups, while the Scheepmaker's crowned-pigeon, especially in the past, has been seen in groups of up to 30 individuals. It is also known that one of the favourite treats of the Victoria crowned-pigeon is figs, while Sclater's crowned-pigeons have been observed eating small crabs while foraging along muddy riverbanks.

They are not picky eaters in captivity either, and although they don't swallow carrots all at once, as the picture shows, they like to eat fruits, berries, vegetables, seed mix for pigeons, mealworms and other arthropods. It is also necessary to add food supplements containing vitamins and minerals to their diet, and sometimes, they like to eat hard boiled eggs too.



Reproduction and life history

Courtship

The four species are similar in this regard, too, although we have very little specific data on some of them. It is characteristic of all species that the male calls the female during courtship with a deep hoota-hoota-hoota-hoota-hoota-like sound. For the Victoria crowned-pigeons, it is typical that males usually coexist peacefully, but at the beginning of the breeding season, they demonstrate their dominance by displaying. During this time, they puff up their chests, and repeatedly spread their wings as if preparing to dance. Sometimes, they charge at each other, but this rarely ends in actual physical contact.

When the males perform their courtship dance, they spread their tail feathers, slightly open their wings, and bow quickly in front of the female. To top it off, they also spread their wings above their heads, to which the female may respond by spreading her wings, then running around the male, keeping her beak close to his, and making a hissing sound.

Did you know that...?

The number of tail feathers in crowned-pigeons is always 16.

Nest

All species build their nests relatively high up, with Western crowned-pigeon nests rarely found below 6 meters (20 ft), but the general height ranges between 3.5 and 15 meters (11.5-49 ft). The nesting material is carried mainly by the male. Their nests are large, strong, and well-constructed, primarily using woody plants and leafy twigs. The Victoria crowned-pigeon also likes to incorporate palm leaves into its nest, while Sclater's and Scheepmaker's crowned-pigeons prefer vines and coarse, dried herbaceous plants.

Did you know that...?

- The male and female crowned-pigeons look alike, although the male can grow slightly larger.
- Crowned-pigeons choose their partners for long term, often forming lifelong bonds.

Egg and chick

The clutch of crowned-pigeons consists of 1 white egg, from which the chick hatches in 28-30 days. Both parents incubate the egg, and after hatching, both feed the chick with crop milk. This is a fatty, milk-like substance produced by the inner wall of the adult birds' crop. The parents regurgitate this nutrient-rich „milk" into the chicks' beaks. The fledglings leave the nest between 28-36 days old, at which point they are still exclusively fed by the parents. They slowly learn to feed independently, but the parents continue to feed them until they are about 56 days old. However, this period can extend to 91 days in Victoria crowned-pigeons. Western crowned-pigeon chicks have been observed returning to the nest at night after leaving it. The chicks reach their full size at about 3 months of age.

Sexual maturity

Young pigeons become sexually mature around 15-17 months of age. In captivity, females have been observed laying eggs as early as 15 months, although this is exceptionally early, and they typically start laying eggs at 1.5-2 years of age.

Lifespan

We don't have much precise and truly reliable data from the wild, but it can be said that they live approximately 10 years in nature. This can be much longer in captivity, with some individuals living up to 30 years, and a few exceptional ones living even longer.

Behaviour and communication

Crowned-pigeons spend most of their time searching for food in small groups on the ground. None of the species are excellent fliers. When startled, they either run away or, more often, fly up to a branch with a loud, clattering sound. They are not known for long-distance flying and remain on the branch until the danger has passed, frequently looking back at the source of the threat. During this time, they move their long tail feathers up and down. Even if they are not visible, they can be easily found by their soft calling sounds. This behaviour has made them easy targets for hunters.

Sometimes they are able to sunbathe in a very surprising pose, in which case they spread their wings and can even lie down on the ground. If they also close their eyes, they often cause alarm among visitors in zoos, but they are fine, just enjoying the sunlight.

Their calls can be very deep and soft, but also higher-pitched, and they can make sounds reminiscent of grunting too.

The pigeons of the world

How many are there, and where do they live?

When we hear the word pigeon, most of us think of the typical 'city pigeons'. However, in addition to certain species having adapted extremely successfully to urban life, pigeons and doves (Columbiformes) are a refreshing splash of colour in the bird world with roughly 350 species. Two-thirds of them live in tropical Southeast Asia, Australia, and the islands of the western Pacific Ocean, but the family also has many members in Africa and South America, as well as a few in the temperate Eurasian and North American zones. Only the domestic pigeon *(Columba livia domestica)*, the common wood pigeon *(Columba palumbus)*, and the Eurasian collared dove *(Streptopelia decaocto)* reach as far as the Arctic Circle, while they are entirely absent from Antarctica. They can only be found in Africa's large deserts as migratory species. The southernmost point is New Zealand, where pigeons live. Pigeons play a fundamental role in these places in various ecosystems, primarily through the spread of plant seeds.

Red-bellied fruit dove (Ptilinopus greyi)

They are unique in the animal world

Several peculiarities characterize the group: when they drink, unlike other birds, they tend to suck the water rather than sip and swallow it. Another unique feature is feeding their chicks with so-called crop milk, a quite special method among birds. Milk production for feeding offspring is mainly characteristic of mammals, including humans. However, pigeons, flamingos, and male emperor penguins belong to rare bird species that produce a milk-like substance to feed their chicks. During "lactation", a curd-like substance forms from the fat-filled cells lining the crop, which they then regurgitate to feed the chicks. This "milk" is rich in proteins, fats, and minerals and contains antioxidants and immune-boosting proteins similar to mammalian milk. These are essential for the growth and development of the chicks. Crowned-pigeons are no exception to this.

Grey pigeon?

The general and most common colour of pigeons is grey. This is so characteristic that even a shade of colour, pigeon grey, is named after them. However, in Asia and Africa, colourful individuals exist, such as the superb fruit dove *(Ptilinopus superbus)* or the common bronzewing *(Phaps chalcoptera)* with iridescent feathers.

Superb fruit dove (Ptilinopus superbus)

Common bronzewing (Phaps chalcoptera)

Therefore, the world of pigeons is not a shade of grey but a colourful world full of beautiful species. Pigeons, with their gentle behaviour, have rightly earned the representation of the symbol of peace and love.

European Pigeons

Stock dove (Columba oenas)

In Europe the number of species are way fewer, than in tropical areas. The most well known species is the rock dove *(Columba livia)*, the ancestor of the feral pigeons. Similar species is the stock dove *(Columba oenas)*, which can be distinguished from rock doves by their grey rump and incomplete dark wing bars. Interesting fact from stock doves, that they can nest in old rabbit holes. The holes can be blocked with crossed sticks by the parents, allowing them to feed their chicks while preventing the chicks from leaving the nest.

Common wood pigeon (Columba palumbus)

Another common european species is the common wood pigeon *(Columba palumbus)*. These relatively big sized birds are commonly found in woods, parks, and gardens, and have adapted well to urban environments. They reside in southern and western Europe and migrate from the colder northern and eastern regions. Despite their bigger and heavy appearance they are quite good fliers.

Another species found across Europe is the Eurasian collared dove *(Streptopelia decaocto)*. Over the past century, it has become one of the bird world's most successful colonizers, expanding far beyond its native range, even getting the invasive status in North America.

It is important to mentione the European turtle dove *(Streptopelia turtur)*, which once widespread, now declining in numbers. You can read about them in the EEP chapter later.

There are a couple of more pigeon species, which can be found in southern or eastern Europe. For example the laughing dove *(Spilopelia senegalensis)* close to the Middle East, or species living on islands belong to European countries, such as Trocaz pigeon *(Columba trocaz)* in Madeira, the African collared dove *(Streptopelia roseogrisea)*, Laurel pigeon *(Columba junoniae)* and the Bolle's pigeon *(Columba bollii)* in the Canary Islands.

Eurasian collared dove (Streptopelia decaocto)

A little taxonomy - pigeon or dove?

The terms “pigeon” and “dove” can be misleading. From a scientific point of view, there is no difference between them, they are all members of the pigeon family (Columbidae). Generally, we call the smaller, slimmer birds doves.

The pigeon family is divided into 5 subfamilies, of which the Columbinae are the most populous with several hundred species, followed by the Treroninae also with over a hundred species, the Gourinae with 4 species, the Otidiphabinae also with 4 species, and the Didunculinae with 1 species.

Wompoo fruit dove (Ptilinopus magnificus)

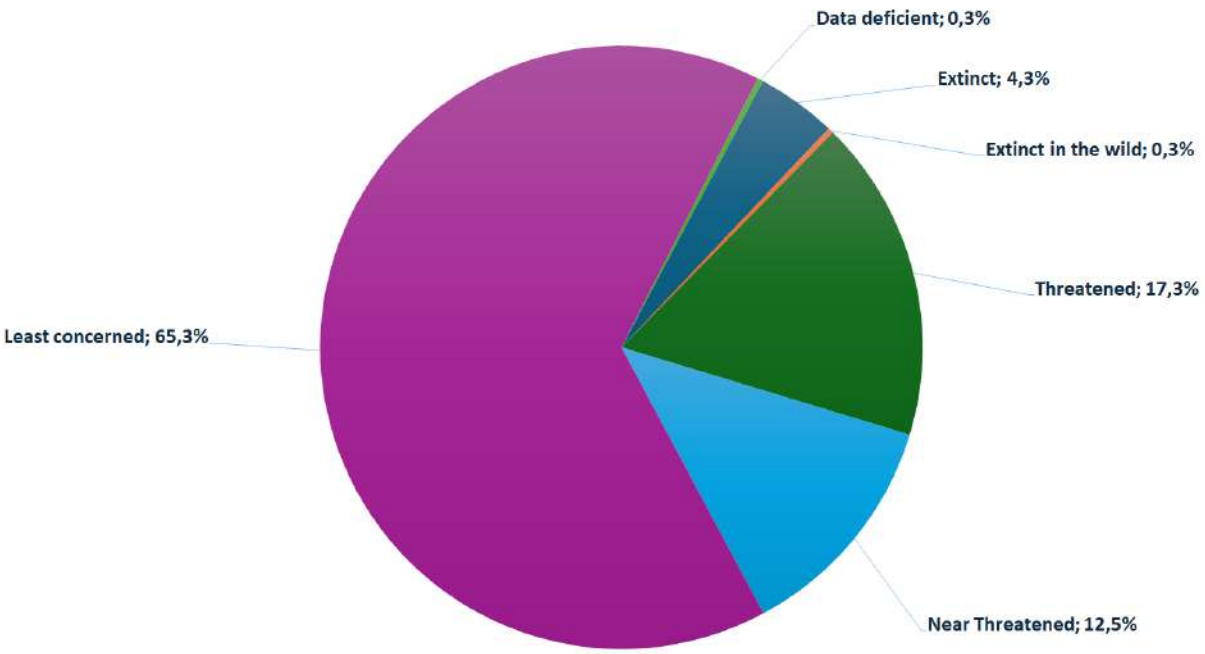
Did you know that...?

The boxer Mike Tyson has been a big fan of pigeons since he was 9 years old, even if not specifically of crowned-pigeons. He once broke up with a girlfriend who dared to tell him to eat his birds. His first punch was also thrown at someone who harmed his birds.

How threatened are they?

In the world of pigeons, we know several species that are already extinct today, the most famous representative of which is the dodo *(Raphus cucullatus)*. In addition to the dodo, another 15 species have also recently become extinct. One pigeon species, the Socorro dove *(Zenaida graysoni)*, is listed as extinct in the wild, and the only specimens remain in zoos.

IUCN conservation status of the pigeons & doves in 2024



There are numerous threats to pigeons, not just predators. The primary source of these threats is humans, whether it's hunting for their meat or feathers, habitat loss, or even population decline caused by domestic cats and rats introduced and spread on islands by humans.

Unfortunately, we don't have to go to distant islands to find endangered species. In Europe, the populations of turtle doves are drastically declining due to intensive monocultural agriculture, habitat loss, and hunting as a granivore.

We have relatively little knowledge about pigeons except for a few cosmopolitan species. The species most threatened with extinction are often the least studied. This can happen because most of the resources for research are located in the northern hemisphere of the Earth, while many endangered species, such as the crowned-pigeons, live in the southern hemisphere. This also implies that we likely underestimate the extinction risk of less known species due to the lack of research and expertise.

A good example is the black-naped pheasant-pigeon *(Otidiphaps insularis)*, described in 1882, which was rediscovered during an expedition on an island belonging to Papua New Guinea in 2022 using a camera trap. Although this is good news, it also means that it immediately landed on the list of critically endangered species and that the area where it lives is very poorly researched.

Another example is the blue-eyed ground dove *(Columbina cyanopis)*, which was not seen in 75 years, until its rediscovery in 2015, when ornithologist Rafael Bessa heard an unfamiliar bird while conducting field work in Brazil. Researchers estimate the number of birds left in the wild between 50 and 250 birds, which lands them straight on the list of the critically endangered species. As with so many species, habitat change and destruction, spreading of invasive grass species, farming and grazing, annual burning of the grassland and climate change all threatens its survival. It gives hope, that in 2023, the chicks of this species were reared in captivity for the first time as a result of incredible teamwork of zoos and NGOs, such as Chester Zoo, SAVE Brasil, Parque das Aves, Instituto Claravis, Toledo Zoo and Bronx Zoo.

Blue-eyed ground dove (Columbina cyanopis)

Animals and crowns

Crowned heads are not only among humans but also animals, like the crowned-pigeons too. Perhaps we got the idea from them. Of course, in the animal kingdom, this headpiece belongs not only to the rulers but to all representatives of the species (although sometimes only males wear it). However, in some cases, the headpieces can still indicate the individual's rank or express his dominant behaviour. The size and number of branches of the stags' antlers largely determine their rank, and birds wearing plumes usually show their mood, emotions, and intentions by raising or smoothing back their ornamental feathers. In addition, the headpieces can often serve as a weapon and a protective device - of course, here you should not think of feather ornaments but of harder formations.

Bird headpieces

The „crown" of animals can consist of many different materials. The crest of the salmon-crested cockatoo *(Cacatua moluccensis)* or the European hoopoe *(Upupa epops)* is most reminiscent of Native American headdresses. In contrast, the fine ornamental feathers of the crowned-pigeon, crowned crane *(Balearica sp.)* or peacock *(Pavo sp.)* have been modified much more. Although it does not resemble a crown but rather ears, the Eurasian eagle owl's *(Bubo bubo)* feather ear can actually be classified as a headpiece, which also serves as a mood indicator, just like the elongated feathers on the nape of the secretary bird *(Sagittarius serpentarius)* or the harpy eagle *(Harpia harpyja)*.

Salmon-crested cockatoo (Cacatua moluccensis)

These headpieces are typically unisex: they can be seen on both sexes. On the other hand, only the male of the king of Saxony bird-of-paradise *(Pteridophora alberti)* wears two decorative feathers on his head that are so long that they no longer point up but hang down. As the bird shakes its head during the courtship dance, they fly around it like the ribbon in the hands of gymnasts.

However, feathers are not the only material a headpiece of a bird can be made of. The crest of the red junglefowl *(Galus gallus)* and its descendant, the domestic hen, is a fleshy, blood-filled skin growth, which the hen also has. Still, the rooster's crest is much larger and more spectacular. This crest does not have a bony base, but in contrast, the helmeted guineafowl *(Numida meleagris)* or the southern cassowary *(Casuarius casuarius)* has it. These growths protect the bird's head from twigs in the thicket but can also play a role in cooling the body. These keratin-coated helmets are filled with a spongy structured bone so it is not too heavy. Also spongy bone stiffens the casques of hornbills - there is only one exception, the helmeted hornbill *(Rhyticeros cassidix)*, whose casque is made of solid bone. Carvings were once made from this formation in Southeast Asia and were valued more than ivory.

Helmeted guineafowl (Numida meleagris)

Not only birds can wear crowns

Not only vertebrates but also arthropods can wear crowns or headpieces.
The name of the spiny leaf insect *(Extatosoma tiaratum)* even includes the word tiara.

Spiny leaf insect (Extatosoma tiaratum)

However, the spikes on its head do not serve to make it stand out, but on the contrary, to hide it. It doesn't just wear such protrusions on its head, but on its entire body, so it looks like a bunch of dry, spiky leaves. The function of the stag beetle's *(Lucanus sp.)* antler is the same as that of the stag's antler, but its composition is not. It is not a true headpiece, but a modified mandible of the beetle. One of the bizarre-looking horns of the Hercules beetle *(Dynastes hercules)* actually grows from its head (the other from its thorax), just like that of the European rhinoceros beetle *(Oryctes nasicornis).*

Hercules beetle (Dynastes hercules)

Of course, mammals cannot be left out either. The structure of the headpieces of cattle, goats, sheep, bison and other horned animals is similar to that of bird helmets: an extension of the skull bone on the inside, and a layer of keratine on the outside. In some species, both sexes have them, while in others, only the males have them. However, in Europe, the red deer *(Cervus elaphus)* wears one of the most spectacular crowns, and this headpiece is shed and regrown yearly. The antler is made of bone, only covered by a layer of fluffy hair until it grows. Horns and antlers are not just decorations but also effective weapons, whether for defence against predators or for fighting rivals. Although accidents sometimes occur, horns and antlers are not killing tools but duelling weapons. Animals who prepare to kill do not grow horns but teeth: no one has ever seen a predator with horns! The „king of the animals", the lion *(Panthera leo)*, wears a mantle, not a crown.

Lion (Panthera leo) ▲

Blue colour

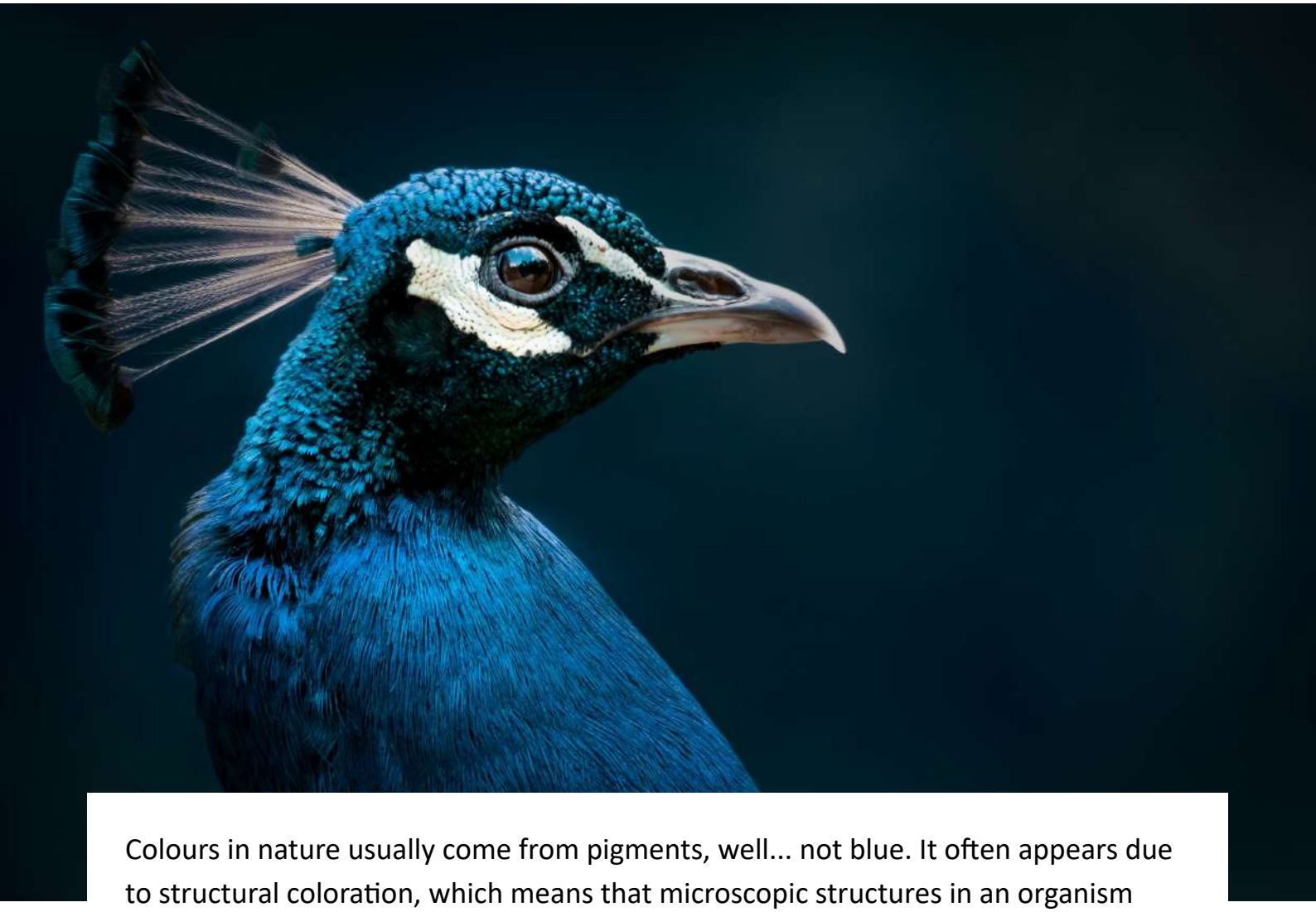
Why blue is the unicorn of nature?

Ever wondered why spotting a truly blue creature in nature is like finding a unicorn? Let's unravel the mystery of why blue is so rare in the wild!

Over 600 million years ago colours had no particular reason because nobody had eyes to perceive them. However, that quickly changed as the first predators evolved. These creatures were the first ones to see colour, so anyone oddly coloured had little chance to survive unless the prey adapted to use their environment as camouflage. No wonder today we find way more blue creatures in the ocean than on land.

Blue tang fish (Paracanthurus hepatus)

Is it actually blue?



Colours in nature usually come from pigments, well... not blue. It often appears due to structural coloration, which means that microscopic structures in an organism scatter light in a way that makes us see blue. You could think of it as nature's hologram.

The morpho butterfly's *(Morpho sp.)* wings for example are covered in tiny scales that reflect blue light. Or in the case of birds like blue jays *(Cyanocitta cristata)*, peacocks *(Pavo cristatus)* and crowned-pigeons the feathers are not actually blue but again thanks to the microscopic structures they reflect blue light. The blue tang fish *(Paracanthurus hepatus),* think of Dory from Finding Nemo, looks blue due to light reflection and refraction in their scales.

Real Blue pigments

However, there are a few organisms which possess actual blue pigments. Take blueberries for example, they are blue thanks to the pigment called anthocyanins. These pigments, however, are sensitive to pH and can shift colours, making stable blue hues rare.

Blue pigments are also extremely rare among animals. However, there is one species of butterfly from South America, the obrina olivewing butterfly *(Nessaea obrinus)*, that has a blue pigment called pterobilin that gives it its distinctive colour. Another invertebrate with real blue pigments, which is native in Europe is the blue slug *(Bielzia coerulans)*. Its pigments are chemicals that reflect light in a special way, making the slug appear blue. The exact chemical mechanism is not fully understood, but it is likely that these pigments bind to special proteins or other molecules that create the blue colour.

Blue slug (Bielzia coerulans)

Mandarinfish (Synchiropus splendidus)

Among the vertebrates, blue pigment was found only in the body of the mandarin fish *(Synchiropus splendidus)*.

Why so rare?

Nature bends towards efficiency. Producing pigments like red, yellow, and brown is easier and more cost-effective for plants and animals. Blue, however, requires a complex setup of microscopic structures or special pigments like anthocyanins in flowers. It's like baking a cake versus making a 10-layer wedding cake - one's just a lot simpler!

Fun facts about blue

Blue is considered the world's most popular favourite colour. Maybe because it's so elusive in nature, it feels extra special!

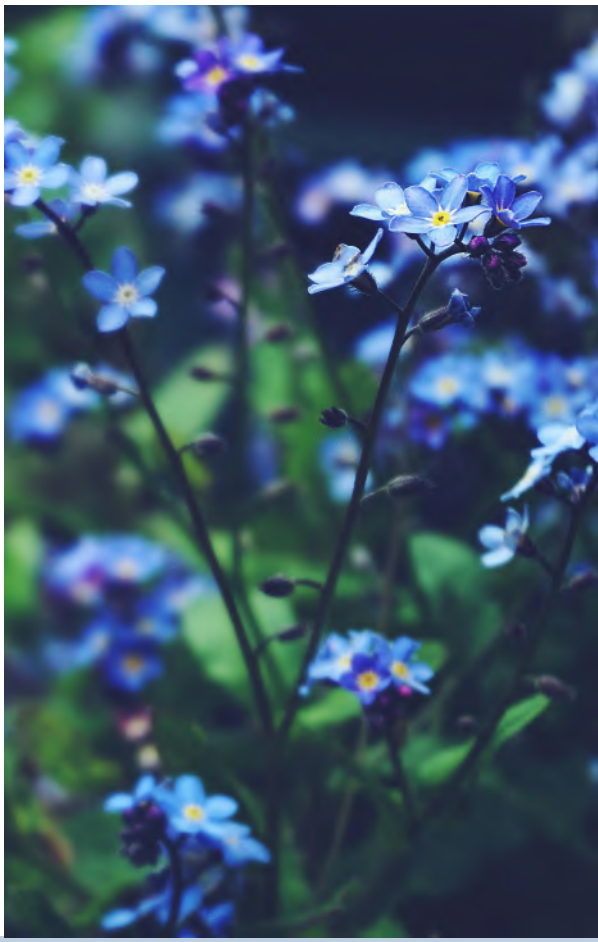
Some animals, like dogs and cats, can't even see the colour blue as vividly as we do. It's like we're in on a special secret.

Next Time You're Outside...

Play a game of „Spot the Blue." Whether it's a tiny forget-me-not flower, a dragonfly, or a bluebird, you'll appreciate the rare and special appearance of this elusive colour even more.

So, next time you marvel at the rare blue wonders of nature, you can impress your friends with why blue is the superstar of the natural world!

Remember, keep your eyes peeled for those natural blue beauties - they're the rare gems of our world!



People and pigeons

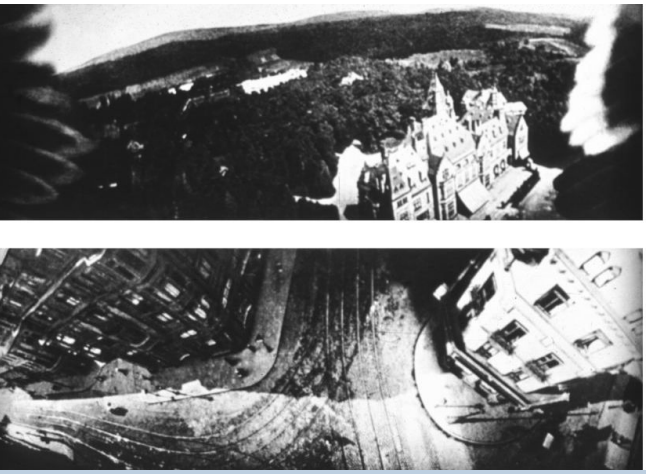
From mountaintops to rooftops

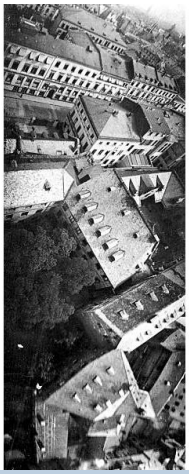
The relative of the crowned-pigeon is the well-known domestic pigeon, which is the oldest domesticated bird in the world. Its domestication probably started around 3,000-5,000 years ago, Mesopotamian stone tablets and Egyptian hieroglyphs suggest, but it is easy to think that it began much earlier, even 10,000 years ago, for consumption purposes. Despite its long history, we have little information about its domestication because its fragile bones have rarely survived, and they do not differ much from the bones of its wild ancestors. This ancestor is the rock dove *(Columba livia)*, which nests on the ledges and crevices of rock walls, so not only dovecotes but also tall city buildings with protruding stone decorations offer a great nesting place for it.

War pigeons, war heroes

Nowadays, countless varieties of pigeons exist, which have been selected based not only on their body shape, colour and plumage, but also on their flight style. In the 18th century, interest in various decorative pigeons arose. Carrier pigeons were already used in ancient times (it is no coincidence that even in the Bible, the pigeon became Noah's messenger), and until the twentieth century, they were of great importance in warfare in the delivery of messages, especially in the mountains, where radio waves do not always spread well. Pigeons were also used for spying in the First World War to take aerial photographs of enemy bases with cameras attached to their chests.

Top left: Aerial photographs of Schlosshotel Kronberg
Bottom left and centre: Frankfurt. Right: Pigeons fitted with cameras





The most famous war pigeon was most probably Cher Ami, who saved the lives of a surrounded battalion by delivering a distress letter. The bird was seriously injured, but it arrived, for which it received an order of merit.

City pigeons

Wild domestic pigeons are typically city dwellers, as high stone buildings resembling rock walls suitable for nesting can be found here. The public opinion on urban pigeons is divided. Some people feed them, and others call them „flying rats" because they can spread diseases and pollute public spaces with droppings. Despite this, large flocks of pigeons are considered part of some cities' landmarks. They are also seen as an invasive species in many parts of the world. However, their presence is also known to positively affect the native birdlife: they are easy prey for predatory birds, thus reducing the predation pressure on other birds. Feralized domestic pigeons hybridised with wild rock pigeons, so the rock pigeon's original, genetically pure populations may no longer exist.

Did you know that...?

Today, crowned-pigeons are found not only in their native New Guinea but also on some Indonesian islands due to accidental introductions.

Human diseases and pigeons

We often hear that feral pigeons carry diseases. Indeed, a systematic review found that 17% of samples from feral pigeons contained zoonotic pathogens, which were viral, the highest amount, then bacterial, and finally, protozoan. There is a certain risk of being infected by a feral bird; however, reporting and proving that a specific disease has a feral pigeon origin is less common. The reason behind this can be that they are few, but also that they are undetected.

In most cases, the transmission occurs via the droplets of these birds but not directly touching them. Dry faecal matter can be pulverised; humans can inhale this dust, and the pathogens in it can infect people via this airborne way. Infection and serious outcomes, even death happened when places were renovated without workers using appropriate protective equipment, where there was a lot of pigeon excrement and flying dust (e.g. renovations of churches and cathedrals concerning psittacosis). It is also possible to get infected by eating inadequately refrigerated or undercooked pigeon meat. Frequent contact with animals in unhygienic environments may favour the transmission of these zoonotic pathogens, especially in Asian countries with pigeon games and crowded bird markets.

We often hear that pigeons carry *Salmonella*, which is true; however, it is worth mentioning that there are various other sources humans can get infected with, such as poultry farms. *Chlamydia psittaci* (psittacosis) is also often mentioned, and while it is possible to be infected via feral pigeons, there is a certain risk from pet parrots, too. *Campylobacter* species are also present in pigeons, and Newcastle disease was also found, however, how often people get infected with these pathogens via pigeons is very difficult to quantify.

Avian influenza (AI) is often heard related to feral pigeons, however, although certain strains of the virus can be present in pigeons, it is believed that pigeons are quite resistant, and their role in spreading the disease between birds and transmitting it to humans is minimal. While they can harbour the influenza virus, primarily waterfowl and shorebirds are known for spreading it. There are studies conducted with AI and pigeons to monitor the outcome of these infections and gather more information about this important topic, but so far, pigeons have not been identified as a high-risk category of animals spreading AI.

We can say that pigeons, like all animals, can harbour zoonotic pathogens, and there is always a risk that these diseases can be transmitted to humans. However, we need to quantify these and act accordingly: we cannot overreact, but we also cannot ignore the risks. In recent decades, pigeon populations have grown rapidly in urban areas, with densities exceeding 2,000 birds per km² (~770 per mi²) in many European cities. We need to consider this risk factor and take appropriate measures to minimise the risk of spreading zoonotic diseases. For this, the most important thing is to follow basic hygiene rules: avoid eating from surfaces pigeons can have access to, contaminating them with their droppings, e.g. outdoor tables of restaurants and where the restaurant does not clean quickly enough, or places where pigeons can have access to the food served.

The infections related to feral pigeons usually worsen the general perception of this group of beautiful birds, but in fact, we should think about all the unique and diverse species, many of which are endangered and found on all continents except Antarctica.

Cultural significance of crowned-pigeons

Western Crowned-Pigeon

The Western crowned-pigeon appears in the Manokwari coat of arms. Manokwari is a coastal city that is the capital of the West Papua region. Although the white colour appears in the crown of the bird in the coat of arms, the bird is definitely a Western crowned-pigeon.

The species also appears on a stamp issued by the Indonesian Post in 1968.

Western crowned-pigeons do not appear only in connection with Indonesia. In the second, spin-off video game of Angry Birds, one of the characters, Willow, was based on them. This game, Stella, was released in 2014. Willow later appears in both Angry Birds movies, most of the time hiding her crown under a striped hat.

Victoria crowned-pigeon

This species appears on the Indonesian 100-rupee banknote, which was in circulation between 1984 and 1995.

Victoria crowned-pigeons are not only featured on banknotes, but also on the 25-rupee coin, which was in circulation between 1971 and 1990.

The Victoria crowned-pigeons appear in the coat of arms of the quasi-state of West Papua.

Did you know that...?

The Western crowned-pigeon, unlike other crowned-pigeon species, is much more prone to melanism, with darker birds having black feathers around the head and back occurring in nature.

Bird ringing

Bird ringing is a method that enables individual marking of birds, during which the bird usually receives a metal or plastic ring with a unique code, which will be attached to its leg or wing. From monitoring the marked birds, we can obtain data on, for example, the feeding, resting and breeding areas of certain bird species, the life history of individuals and bird populations, changes in the population size of different bird species, and often also from the age of the recaptured individual. All of this is essential information for nature conservation. Birds hatched in captivity, such as crowned-pigeons in zoos, are often given rings, too, which can help identify them without catching the individuals. Captive birds' ring numbers and colours are entered into an international database. With the help of this, by entering and searching the ring number, we can get information back: the place of origin, age, sex and much more information, which can be assigned to the pigeon's identifier.

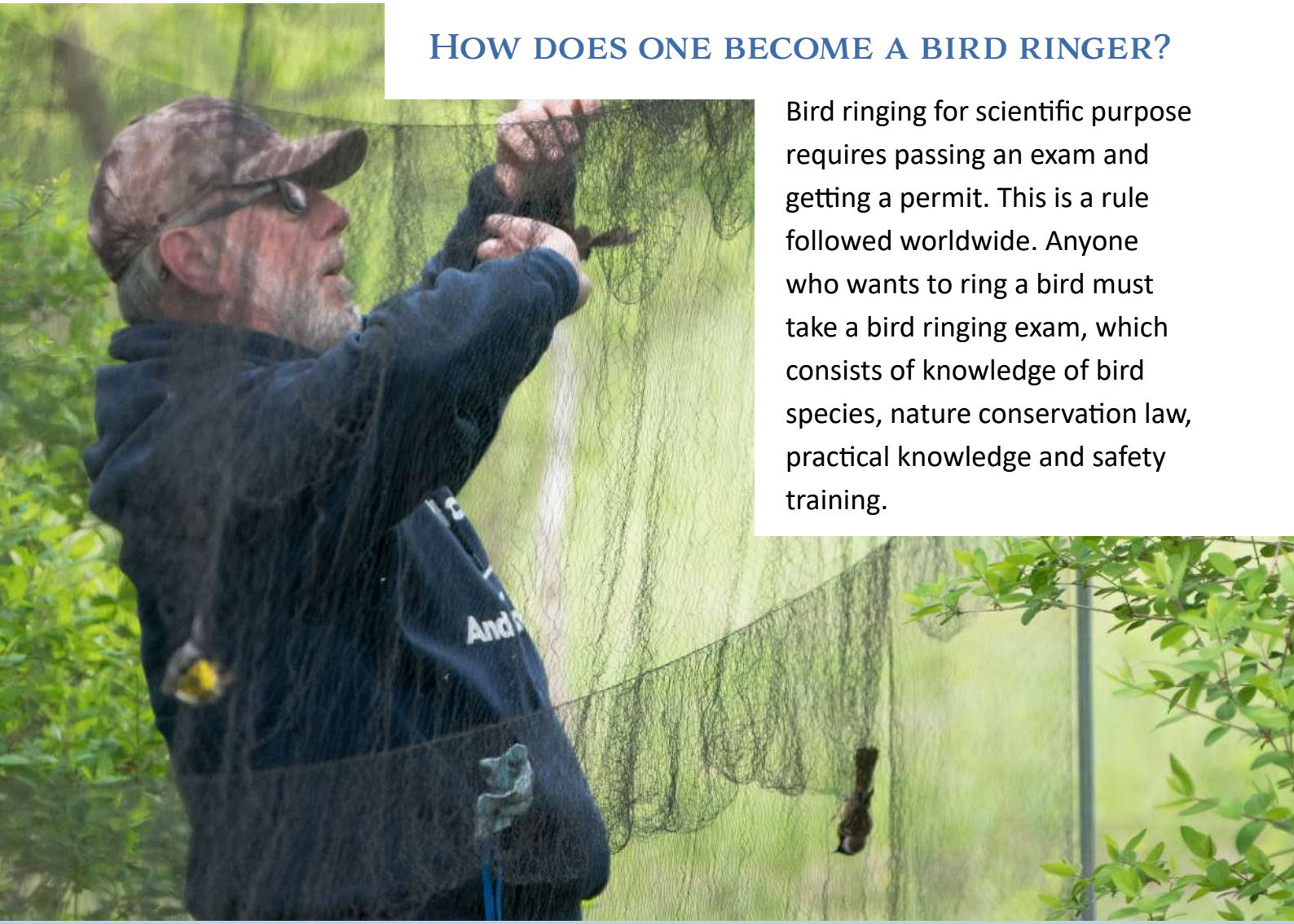
Did you know that...?

While domestic pigeons usually lay two eggs at a time, crowned-pigeons lay only one and breed only once a year, although a secondary clutch can occur in captivity.

How does bird ringing work?

The ring can be placed on the birds when they are young or adults. In the latter case, different methods must be used to capture the birds. Smaller birds are usually caught with mist nets, while larger birds are caught using different kinds of traps depending on their lifestyle. Of course, all of these have strict conditions and rules. After capture, they are marked, age and sex are determined, and various biometric data are recorded, providing researchers with additional useful information. The capture's circumstances are also registered within most projects, e.g., location of the mist net, weather conditions, etc. Marking rings are made of different sizes and materials to make the best fit for all the species. The most commonly used ring is a metal ring on the leg of the bird. Some larger, long-legged bird species, whose lifestyle allows researchers to observe them with binoculars, are fitted with a larger, coloured, plastic ring with an easy-to-read code. This method is very efficient, providing much data without capturing the bird multiple times.

How does one become a bird ringer?



Bird ringing for scientific purpose requires passing an exam and getting a permit. This is a rule followed worldwide. Anyone who wants to ring a bird must take a bird ringing exam, which consists of knowledge of bird species, nature conservation law, practical knowledge and safety training.

How much trouble are crowned-pigeons in?

The best-known database on the extinction risk status of animal, fungus, and plant species is the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species.

The list divides species into 9 categories:

Extinct (EX) – beyond reasonable doubt that the species is no longer extant.

Extinct in the wild (EW) – survives only in captivity, cultivation and/or outside native range, as presumed after exhaustive surveys.

Critically endangered (CR) – in a particularly and extremely critical state.

Endangered (EN) – very high risk of extinction in the wild.

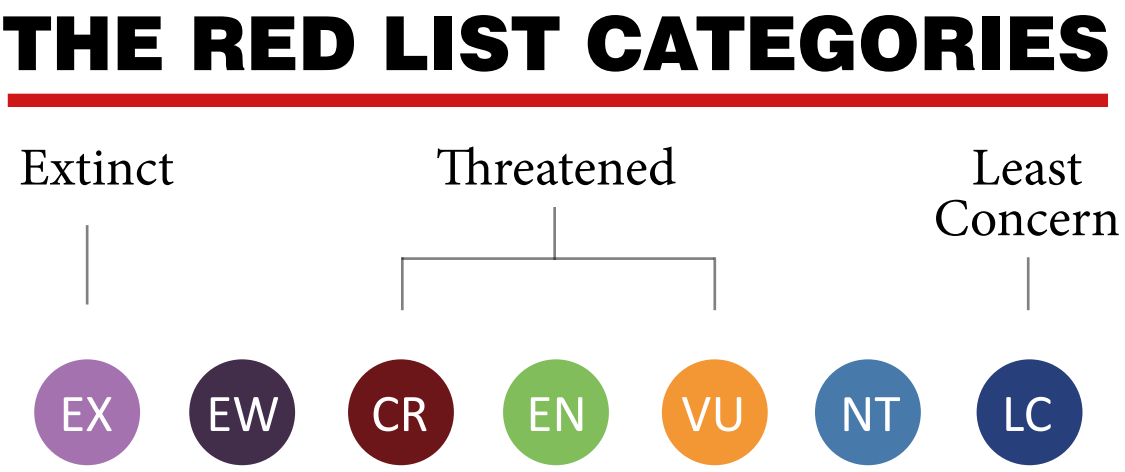
Vulnerable (VU) – it is considered to be at high risk of unnatural (human-caused) extinction without further human intervention.

Near threatened (NT) – close to being endangered in the near future.

Least concern (LC) – unlikely to become endangered or extinct in the near future.

Data deficient (DD) – there is not enough data to evaluate the species.

Not evaluated (NE) – the species is not evaluated yet.



According to the IUCN Red List of Threatened Species, all 4 species of crowned-pigeons have been declining recently, and unless we do something about it, this trend is unlikely to stop any time soon. In addition, these birds live in a relatively isolated part of the world, where they are difficult to research, and accurate data on their populations is still lacking. This means they may be in even more trouble than we realize.

Their current population is as follows:

	IUCN Red List Category (2024)		Number of mature individuals
Western crowned-pigeon	Vulnerable within the Threatened category	VU	Estimated between 2,500-10,000
Sclater's crowned-pigeon	Near Threatened	NT	Unknown
Victoria crowned-pigeon	Near Threatened	NT	Estimated between 10,000-20,000
Scheepmaker's crowned-pigeon	Vulnerable within the Threatened category	VU	Estimated between 2,500-10,000

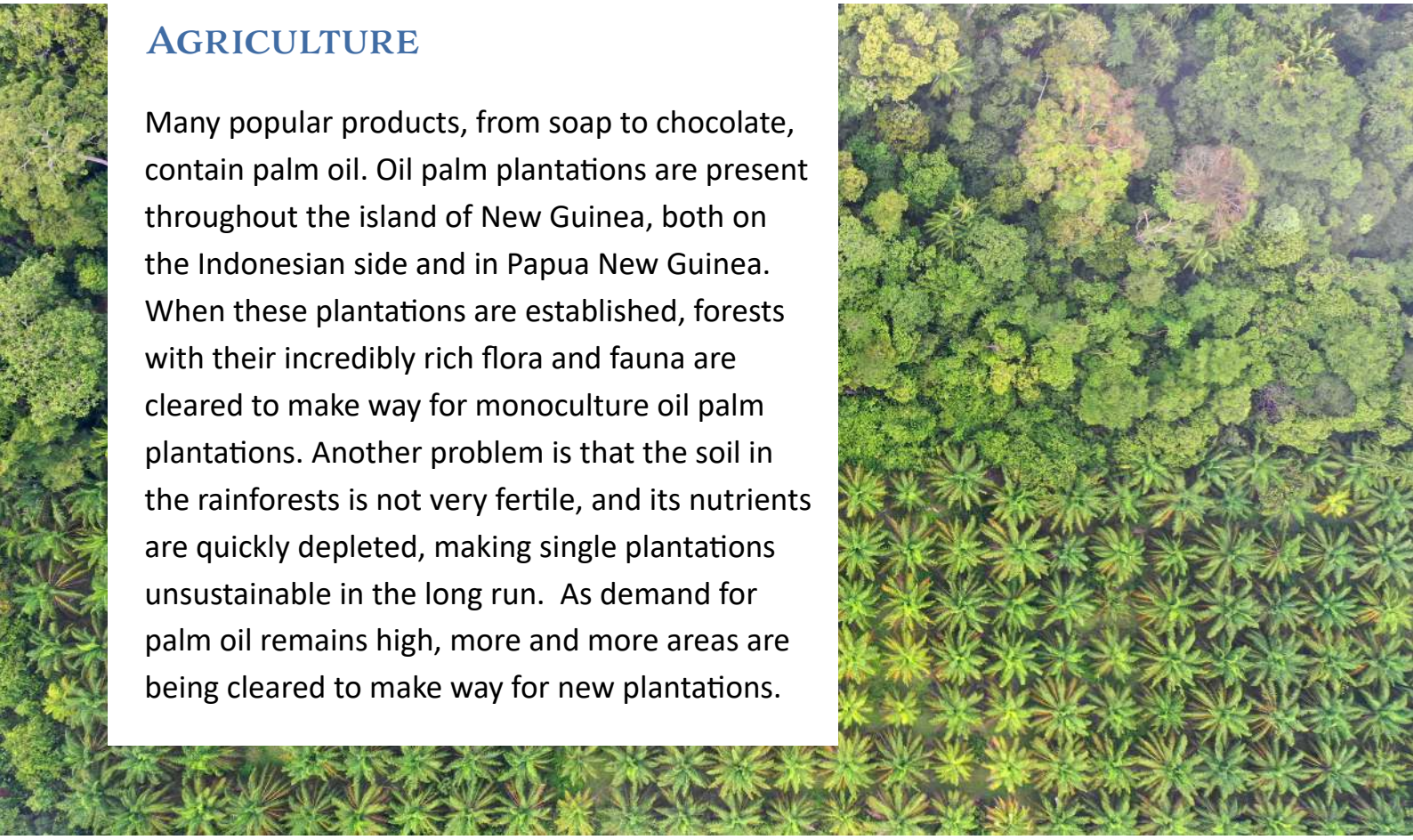
There are many reasons for this unfortunate trend:

Habitat loss

The disappearance of rainforests is a serious problem in terms of species extinction, and crowned-pigeons are no exception. These birds live exclusively in low-lying, flat rainforests on the island of New Guinea, and their lifestyle is adapted to this environment. If there are no forests, there are no crowned-pigeons either. They feed on the floor of dense forests, eating local fruits, young shoots, and sometimes insects, while forest-forming species provide shelter for their nests. But why are forests disappearing? Unfortunately, humans are largely to blame, but let's take a look at exactly how.

Agriculture

Many popular products, from soap to chocolate, contain palm oil. Oil palm plantations are present throughout the island of New Guinea, both on the Indonesian side and in Papua New Guinea. When these plantations are established, forests with their incredibly rich flora and fauna are cleared to make way for monoculture oil palm plantations. Another problem is that the soil in the rainforests is not very fertile, and its nutrients are quickly depleted, making single plantations unsustainable in the long run. As demand for palm oil remains high, more and more areas are being cleared to make way for new plantations.



Logging

Making way for plantations is not the only reason for deforestation; trees are also cut down for direct use as timber. Timber is used to make furniture, musical instruments, construction lumber or firewood. There are legal and sustainable ways to do this. However, there are certain companies that often rely on cheaper, illegal logging for their wood supply, contributing to the loss of habitat for pigeons.

Mining

Mining is also a growing problem in New Guinea. Forests are being cut down and soils dug up for gold and copper mining, so the real treasure - the rainforest wildlife - is being lost. Oil and gas extraction is also common on the island. Mining also deprives the soil of water and nitrogen, which are vital for trees, and pollutes the environment. One example of pollution is the high levels of mercury in active mines. This contributes to the poor quality, polluted soil left behind when the mines are exhausted, and, sadly, it has also been shown that the rate of forest regeneration in abandoned mine sites is the lowest in tropical forests. Mankind's hunger for raw materials does not seem to be decreasing, so the extent and quantity of mines is an ever-growing problem.

Spread of infrastructure

The extraction and transportation of raw materials requires a major expansion of infrastructure, and the development of road networks means the clearing of more and more forest. Not only does this lead to the fragmentation of previously contiguous forest stands, but it also directly harms wildlife when forests are cleared. Opening up new roads to relatively pristine areas also makes it easier for hunters to reach birds.

Poaching

The meat of crowned-pigeons has long been eaten by locals and their feathers are also used, which was not a problem when they had stable populations, and their habitat was relatively untouched. Which species is more threatened by hunting also depends on which country they are found in within the island of New Guinea. When startled, crowned-pigeons take to the air with a loud flap of their wings and watch from a relatively high altitude. Here they are harder to kill with traditional weapons, but since they do not fly very far, firearms pose a serious threat. As firearms have not been widely used in Indonesia in the past, hunting has reduced their numbers mainly on the Papua New Guinea side, where they are difficult to spot in disturbed forests close to settlements. Trapping is also common in northern Papua, where locals use snares to catch ground-dwelling birds.

Collecting feathers

Spirit house and its owner in Paiya Village with crowned-pigeon feathers on the headpiece

Roika Waria Sing-sing tribe member from Mount Hagen in Papua New Guinea. Note the use of Victoria crowned-pigeon feathers in headdress

Illegal collection of feathers also poses a threat to the birds. Local tribes often use the feathers of local bird species to decorate their traditional clothing. In the past, these feathers used to be prized and often kept for generations, making the practice sustainable. But changing customs and the opportunity for easy money have disturbed this balance. Increasingly, not only crowned-pigeons but also other bird species with decorative feathers are falling prey to the illegal trade, collectors, and ignorant tourists.

Did you know that...?

The crowned-pigeon's feathers do not contain blue pigment; their colour is due to light refraction.

Illegal bird trade

Because of their distinctive appearance and large size, crowned-pigeons are also popular with bird keepers. To meet this demand, illegal bird trappers and traders capture adult birds, or remove young ones from nests to raise and resell them in the hope of making easy money. The animals are often transported from one country to another in appalling conditions before reaching their final owners, if at all.

Western crowned-pigeons in an online ad

Accredited zoos, wildlife parks and rescue centres contribute to species conservation through captive breeding, research, rehabilitation and fundraising, and crowned-pigeons are no exception. And thanks to research, we can also learn more about crown-pigeon pigeon populations in the wild by better understanding the species. The institutions also focus on education. In addition to direct conservation efforts, they also raise awareness about the species, the threats they face, how to work with them, and how the small, everyday, conscious decisions of ordinary people can help ensure their survival, so that the crowned-pigeons do not suffer the same fate over time as their larger relative, the dodo.

Did you know that...?

Crowned-pigeons can often live up to 30 years in captivity.

Extinct pigeons

Five percent of the world's known pigeon species, 16 species in total, are now extinct - and humans are to blame for their disappearance. Two of them stand out, and their sad stories are known worldwide: the dodo and the passenger pigeon, but there is another, lesser-known species too, the Choiseul ground pigeon.

Dodo
(Raphus cucullatus)

The dodo was one of the first species documented to have been wiped out by European man and has therefore become a symbol of extinction. Its home was Mauritius, a remote island in the Indian Ocean. It was first discovered by Europeans in 1505 by Portuguese sailors. The island was home to a funny-looking, flightless bird the size of a turkey whose meat tasted bad but was easy to kill, so people killed it wherever they could. It was called stupid and clumsy for not fleeing from humans, but it was simply unprepared for attack, living in a closed world without predators.

The Dutch took over the island after the Portuguese but were no kinder to the strange bird. In addition, introduced animals such as dogs, pigs, and rats destroyed its eggs and chicks. And so, the dodo became extinct before it was definitively established that it was a member of the pigeon family - because of its large beak, allegedly fat body, and a quirky tuft of tail feathers, many people still think it is a duck. A few live specimens made it to Europe but did not survive long. Today, it is not even possible to find a complete taxidermy specimen of a dodo, only a few beaks and legs. The last living specimen was seen in 1662 - just over 150 years after it was discovered.

Passenger Pigeon

(Ectopistes migratorius)

The passenger pigeon was one of the animals thought to be least likely to go extinct because it existed in such large numbers (indeed, the same was true of the American bison, which was also nearly wiped out). When migrating, passenger pigeons actually darkened the skies. Although they had always been hunted by Native Americans for food, the loss was not felt by the vast population. They were not only shot for meat but also hunted for sport, just to kill them, with increasingly modern weapons. At the same time, deforestation wiped out their nesting grounds and a growing market for pigeon meat developed in the late 1800s, which was supplied by modern technological meat conservation processes.

On one occasion, a train carrying the carcasses of shot birds derailed: 200,000 dead pigeons fell into the ditch. The last wild specimen was shot by a 14-year-old boy in March 1900. There were a few passenger pigeons at the Cincinnati Zoo at the time, but breeding them was not successful. The last bird, Martha, became extinct in 1914. Her death focused the attention of the American public on conservation. Some scientists have speculated that factors other than human activity may also have contributed to the extinction of the species, as its population size had fluctuated considerably in the past, but this is not enough to ease our consciences, as humans did everything they could to bring about its demise.

"So prodigious was the number of the birds that the scattering fire of the guns, with the hurling of missiles and the cries of the boys, had no other effect than to break off small flocks from the immense masses that continued to dart along the valley, as if the whole of the feathered tribe were pouring through that one pass. None pretended to collect the game, which lay scattered over the fields in such profusion as to cover the very ground with fluttering victims. Leather-Stocking was a silent but uneasy spectator of all these proceedings, but was able to keep his sentiments to himself until he saw the introduction of the swivel into the sports.

"This comes of settling a country!" he said. "Here have I known the pigeon to fly for forty long years, and, till you made your clearings, there was nobody to skeart or to hurt them, I loved to see them come into the woods, for they were company to a body, hurting nothing being, as it was, as harmless as a garter-snake. But now it gives me sore thoughts when I hear the frighty things whizzing through the air, for I know it's only a motion to bring out all the brats of the village. Well, the Lord won't see the waste of his creatures for nothing, and right will be done to the pigeons, as well as others, by and by."

James F. Cooper: The Pioneers, 1823

Choiseul ground pigeon
(Microgoura meeki)

While all recent crowned-pigeons are classified in the genus Goura there was formerly another species that was quite similar to these: the Choiseul ground pigeon. It even had a slaty-blue crest similar to the crowned-pigeons but smaller.

It inhabited Coiseul Island which is part of the Solomon Islands in the Pacific Ocean. The last specimen was recorded in 1904. As its name suggests, the Choiseul ground pigeon was a mainly ground-dwelling bird which lived in the forests of Choiseul Island, where it was endemic.

This enigmatic bird is not only the flag species of the Choiseul Island Province but has also been chosen as the logo of the newly established EAZA Extinct Pigeons & Doves EEP. About what is an EEP you can read it a bit later.
The species became extinct by introducing cats onto the island, which devoured its eggs, which the birds laid on the ground.

The logo of the Extinct Pigeons & Doves EEP

EEP - EXCUSE ME, WHAT?

Species conservation is a huge team effort and this is also true for crowned-pigeons. One of the driving engines of this is the European Association of Zoos and Aquaria (EAZA), which coordinates thousands of experts from hundreds of institutions to help species survive. The EAZA Ex-situ Program (EEP) plays a crucial role in this.

Over 500 species have an EEP program, including three species of crowned-pigeons: the Western crowned-pigeon, Sclater's crowned-pigeon, and the Victoria crowned-pigeon. The primary goal of these programs is to maintain healthy captive populations based on the European studbook of each species through recommended breeding. This ensures a genetically and demographically stable population, serving as an insurance population in case the number of the species is in decline or threatened with extinction.

The ultimate aim is to make these populations self-sustaining, eliminating the need to capture more animals from the wild.

The EEP program does not only apply to a specific zoo; all crowned-pigeons of all EAZA members are part of the population, regardless of which country they live in.

How can a species have an EEP program?

The EEP is established within EAZA's Regional Collection Planning (RCP). This is carried out by the so-called Taxon Advisory Group (TAG) of the given taxonomic group.

During this, experts gather and, in the framework of several days of intensive work, decide which species zoos can and need to concentrate on by keeping and breeding them in captivity. The most important aspects can be, for example:

- whether the conservation status of the given species is threatened
- or whether there are enough individuals in zoos to maintain a healthy population
- or whether we can significantly contribute to the conservation of the given species by keeping it in captivity
- or whether we have the necessary human and financial resources available

It's also important to consider how realistic the goals are and what risks are involved. Based on this, not every species has an EEP program.

However, if they have, each EEP program has specific goals. The main goal of most EEPs is to maintain a healthy population, both in terms of demography and genetics.

These programs often have additional goals like education or fundraising. The money raised is typically used to support conservation organisations, fund research, assist local communities, or even help reintroduce the species into the wild.

Interestingly, there are also EEP programs for species that are already extinct. While these programs can't save the species, they serve an educational purpose, helping us learn from past mistakes to prevent future losses.

Demographically and genetically healthy? What does that mean?

The key point here is to maintain a genetically healthy population by encouraging breeding between more distantly related birds. This helps prevent inbreeding, which can lead to serious problems like unviable animals, inability to reproduce, higher chick mortality, and, ultimately, the extinction of the population in captivity.

Demographics also play a crucial role in keeping the zoo population at the right size. This is important for two main reasons: avoiding populations that are too small and preventing overbreeding.

If we don't breed enough, the population can become too small. Smaller populations are more vulnerable to problems like inbreeding or an imbalanced sex ratio, where more males hatch than females, disrupting the species' normal sex ratio of the species and reducing their chances of survival.

On the other hand, if we allow these birds to breed too much, zoos will run out of space for new chicks, forcing us to stop breeding. As a result, the population could age, and without careful management, we might end up with no birds of reproductive age.

For crowned-pigeons, it's important to remember that while all three species have similar care needs and can live in similar aviaries, they shouldn't be housed together, because they might hybridise. Therefore, in EAZA zoos, we must carefully manage and distribute the birds to ensure that all three species have equal opportunities for space and survival.

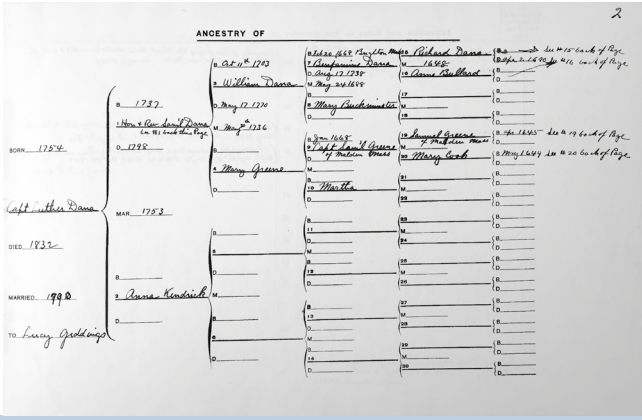
And who coordinates this task?

The EEP species coordinator oversees this process, but they work with a team that includes the zoos housing the animals, various specialists, population biologists, veterinarians, dieticians, species experts, and many others, all united in the effort to save the species.
In the past, each zoo managed its own collection independently, but now things have changed. Zoos collaborate to care for species with a common goal while still operating based on their unique local needs too. For example, a bird in Spain might be moved to a zoo in the Netherlands to mate and help grow the European population. The EEP coordinator recommends these moves based on the species' European studbook, which tracks the genetics and demographics of the population.

Currently, in 2024, the three crowned-pigeon EEPs are coordinated by three dedicated colleagues from EAZA zoos: the Sclater's crowned-pigeon EEP by Kristiansand Dyrepark in Norway, the Victoria crowned-pigeon by Mandai Wildlife Reserve in Singapore and the Western crowned-pigeon by Budapest Zoo & Botanical Garden in Hungary.

But what are studbooks?

A studbook is like a detailed family record for crowned-pigeons. It includes information such as where and when each bird was hatched, who its parents are, which zoos it has lived in, who it has bred with, and where it eventually died. By keeping these thorough records, we can trace the family history of these birds all the way back to the very first crowned-pigeons in EAZA zoos. This helps us identify which genetic lines are either too common or too rare in the current population, allowing us to maintain as much of the original genetic diversity as possible.



The family tree of Luther Dana, american chemist from 1790. It works the same with crowned-pigeons too, the gaps need to be investigated to trace ancestry back

Does the coordinator have other duties?

Yes! As part of the teamwork, coordinators create a document called the Best Practice Guideline, which outlines the best and most up to date methods for caring for a specific species. For crowned-pigeons, this guideline gathers all the latest information on how to properly care for and breed them. This ensures that every zoo has access to the knowledge needed to provide the best possible care.

The guideline also includes details about the species' status in the wild, ongoing research (whether in zoos or the field), and anything else that could help the species survive.

Additionally, a long-term, 5-year plan (LTMP) is developed to outline how the EEP will achieve its goals as part of the regional collection planning.

Here you can read about other pigeon and dove species with EEPs, which are important representatives from a conservation standpoint, and you can also see them in zoos:

Mauritius pink pigeon

The pink pigeon *(Nesoenas mayeri)*, found only on the Mascarene island of Mauritius, almost went extinct. Thanks to conservation efforts by the Durrell Wildlife Conservation Trust, its numbers have grown since 1977. Gerald Durrell himself started the first captive breeding program for these birds. Today, the pink pigeon is classified as Vulnerable on the IUCN Red List, and it is considered a success story in conservation. However, they still face dangers from predators and a loss of habitat. Keeping a healthy population requires monitoring their genetic diversity, the very low number of birds left lead to the high risk of inbreeding. Therefore nature conservation experts cannot lay back, and continued efforts are needed to protect them from extinction, both in captivity, both in the wild.
The species is coordinated by a dedicated colleague from Jersey Zoo, United Kingdom.

Socorro dove

The Socorro dove *(Zenaida graysoni)* is a bird species which is extinct in the wild. The last time anyone saw it in the wild was in 1972, and now it can only be found in captivity. It originally lived only on Socorro Island, off the west coast of Mexico. Efforts are underway to reintroduce the species, led by the EAZA in cooperation with various Mexican government agencies.

Like many island birds that evolved without mammal predators, Socorro doves do not fear humans or animals like cats, which contributed to their disappearance in the wild.

Male doves often chase away their young once they can survive on their own, and the parents separate temporarily. This behavior is thought to have developed because it helped protect them from being easy prey for hawks, which used to be their main predators.

The species is coordinated by a dedicated colleague from Frankfurt Zoo, Germany.

Blue-headed quail-dove

The Blue-headed quail-dove *(Starnoenas cyanocephala)* is an endemic species from Cuba. This ground dwelling bird has a distinctive body shape and behavior reminiscent of a quail, indicating that they spend much of their day on the ground.

With 600-1400 animals remaining in the wild and the population decreasing due to various anthropogenic threats, this species is threatened with extinction.

The Blue-headed quail-dove is very distinct in its evolution, making its conservation even more important. The species seems to be most closely related to an Australian dove genus (Geophaps) which raises the question of how the blue-headed quail-dove distributed to Cuba in the first place, since it is unrelated to other American dove species.

The species is coordinated by a dedicated colleague from Zürich Zoo, Switzerland.

Mindanao bleeding heart

The Mindanao bleeding heart *(Gallicolumba crinigera)* is an endemic species of the Philippines. The scientific name derives from a fusion of the Latin *gallus* („chicken") and *columba* („pigeon"), which refers to the bird's way of life: like a chicken, it spends its time on the ground, gathers its food here, and when it is frightened, it runs first and only then flies. Its common name refers to the red spot on the chest. In its natural habitat, its diet consists of various seeds, fruits and berries, and it also eats small invertebrates.

It is threatened by deforestation and hunting, and by the illegal bird trade. We don't know exactly how many birds live in the wild, but their situation has deteriorated over time. In 1988 it was not considered endangered, then in 1994 it was evaluated as vulnerable, and in 2000 it was classified as endangered. Since we still don't know how fast its numbers are decreasing, in 2007 it was again reclassified as ‚only' vulnerable, according to estimates, ~1000-2500 adults remained in its natural habitat.

The species is coordinated by a dedicated colleague from Bristol Zoo Gardens, United Kingdom.

Nicobar pigeon

The Nicobar pigeon *(Caloenas nicobarica)* is not only also a larger living species of the Columbidae but also a distinctive one with a metallic green colouration and lancet-like feathers around the neck.

It is a close relative to the tooth-billed pigeon *(Didunculus strigirostris)*. Whereas the latter is considered critically endangered by the IUCN Red List, the Nicobar pigeon is only near threatened. However, its habitats (forests and shrubland on small Southeast Asian islands) are dwindling due to human impact.

Thus, the Nicobar pigeon stands as a model species for the highly endangered tooth-billed pigeon. Zoo populations of the species will help us understand the biology of the tooth-billed pigeon.

The species is coordinated by a dedicated colleague from Dortmund Zoo.

Santa Cruz ground-dove

The Santa Cruz ground-dove *(Pampusana sanctaecrucis)* is an endemic bird living in the southern Solomon Islands and Vanuatu. This bird is endangered due to habitat loss and poaching.

In recent years multiple events happened which made their survival even more challenging: 120 Santa Cruz ground-doves, saved from poachers, are now the species' last hope after a volcanic eruption destroyed much of them on Tinakula, one of the Solomon Islands. Due to an excellent international collaboration, these birds are now safe, and part of them living in the Solomon Islands, and part of them are act as an insurance population for the species, with the hope of returning them to their native habitat when conditions improve. It is very important, as experts believe that the rescued doves make up most of the birds that still exist.

The species is coordinated by a dedicated colleague from Mandai Wildlife Reserve, Singapore.

European turtle dove

Turtle doves *(Streptopelia turtur)* are migratory birds. They are found all across Europe and the Middle East, migrating south for the winter beyond the Sahara. Studies of a satellite-tagged dove show that they mostly migrate at night, flying up to 700 km at speeds of 60 km/h (37 mph). Their gentle, soothing song can be heard all summer from their hiding spots.

Sadly, turtle dove numbers are dropping quickly in Europe, with a 78% decline between 1980 and 2013. Environmental groups say this is partly due to changes in farming that have made it harder for them to find the weed seeds and shoots. Hunting in Mediterranean countries also plays a role, with an estimated two to four million turtle doves shot each year.

This EEP is a brand new one, and it hasn't had a dedicated EEP coordinator yet.

What can YOU do?

You might think crowned-pigeons live so far away, what could you possibly do to save them?

Helping any birds also helps pigeons. Here are some tips you can do locally and globally to save these beautiful animals:

What can you do locally?

Even if Southeast Asian birds seem distant and you rarely venture beyond your backyard, you can still contribute to conserving local bird populations. Participate in citizen science projects organized by birdwatching clubs and engage in local bird surveys.

Make your garden or green area around you bird-friendly

Creating a bird-friendly garden is quite easy with very little time and effort. Many bird species that were once common in European gardens are now declining. By transforming your garden into a bird-friendly haven, you can positively impact local bird populations. This is also a fantastic opportunity to educate children about environmental care by involving them in the planning and creation of your bird-friendly garden. For more details, you can visit the previous EAZA campaign „Let it Grow" website at www.letitgrow.eu.

Feed birds during the winter

During winter, setting up a bird feeder is an excellent way to appreciate wildlife. The purpose of feeding birds in winter is not to keep them alive, but to lure them closer to us. This is wonderful for two reasons: the sight and close observation of birds is an extraordinary experience for both children and adults, which also encourages us to protect the natural environment. And second, the presence of birds means biological protection thanks to the insects and weed seeds they collect near the feeding place.

In Europe, the feeding period lasts from the onset of the first frosts until their end. If you feed birds, it is sufficient to put out black sunflowers as food, but as an extra you can add commercially available finch food. In addition, you can give fruits (apples and pickable berries such as wild grapes, ivy, thorn, western whip tree). You can give some animal fat (mainly duck, goose and pork skin). It is important to know, that the birds of the feeder are not food waste disposers, do not give them leftover food, do not experiment with them!

Providing water is also important (more precisely, it is worth starting the winter feeding next to the year-round bird bath or waterer), for several species the winter drinking and bathing place is the real attraction. Change the frozen water to fresh water regularly.

Stop feeding the birds during the breeding season, after the hatchlings have hatched, because this might cause functional starvation and death of the chicks who are unable to digest the seeds. If you insist feeding birds during spring and summer, it is always best to follow your local BirdLife's recommendation.
As spring approaches, install a nest box to support the breeding success of local bird populations.

Keep your cat indoor

Outdoor and feral cats affect wildlife populations. We acknowledge that there is a need for more precise studies about cat predatory behaviour, estimates of total prey population size and other important factors, but outdoor cats kill local wildlife.

Prevent bird collisions

Every year there are billions of birds dying due to glass collisions. If you can, reduce the transparency and reflectivity of dangerous glass panels.
See: www.abcbirds.org/program/glass-collisions for ideas and check the availability of them in your area.

The print a bird left on glass after collision

See what is going on in your area

Connect with your local BirdLife partner organization, join guided tours, and learn about the threats and needs of birds in your area.

You can document wild birds at home or while on vacation using birding smartphone apps like eBird from the Cornell Lab (ebird.org). These apps allow you to share your bird sightings with researchers and fellow birders in real-time, enhancing the value of your birding activities for conservation efforts and helping you keep track of your observations over time.

Choose pigeon friendly sustainability labels

During shopping, different sustainability labels help us to make an informed choice. By purchasing such products, you can contribute to the survival of crowned-pigeons.

The most important labels to look for:

Rainforest Alliance Certified label

The trademark designates products that come in whole or in part from farms certified by the Rainforest Alliance.

The purpose of Rainforest Alliance certification is to protect and preserve rainforests and the animals and people living there, as well as to promote the sustainable cultivation of coffee, tea and other crops.

Places of origin must be managed according to the strict guidelines of the Rainforest Alliance Sustainable Agriculture Standard. This includes the criteria of environmental protection, social responsibility and profitability.

RSPO (Roundtable on Sustainable Palm Oil) label

The Round Table on Sustainable Palm Oil (RSPO) is a global initiative that aims to make sustainable palm oil the norm. This is to cause less damage to the environment where the crowned-pigeons also live. The criteria for certification are ecological and social. These include respecting the fundamental rights of farmers and workers in the producing regions. Areas worthy of protection must be excluded from oil palm cultivation.

You can meet with palm oil in a huge variety of everyday products: make up, soaps, processed food, such as cookies, pizza dough, instant noodles, but also biodiesel or detergents.

Many products that use palm oil aren't clearly labelled. Look for products with the RSPO logo, and be aware, that palm oil and its derivatives can be present in the product if you see the following ingredients: Vegetable Oil, Vegetable Fat, Palm Kernel, Palm Kernel Oil, Palm Fruit Oil, Palmate, Palmitate, Palmolein, Glyceryl, Stearate, Stearic Acid, Elaeis Guineensis, Palmitic Acid, Palm Stearine, Palmitoyl Oxostearamide, Palmitoyl Tetrapeptide-3, Sodium Laureth Sulfate, Sodium Lauryl Sulfate, Sodium Kernelate, Sodium Palm Kernelate, Sodium Lauryl Lactylate/ Sulphate, Hyrated Palm Glycerides, Etyl Palmitate, Octyl Palmitate, Palmityl Alcohol

FSC (Forest Stewardship Council) label

The Forest Stewardship Council® (FSC®) is a certification system that certifies responsible forest management. Its aim is to promote environmentally friendly, socially responsible and economically sustainable forest use. The FSC® logo guarantees that products marked in this way meet FSC® standards and that forests are not converted into plantations but are preserved in their natural state. This also protects forests where crowned-pigeons live.

FSC®'s requirements include using the right wood species in the production areas, protecting valuable habitats, banning genetically modified plants and minimizing the use of pesticides. The FSC® label can be obtained at three levels, and compliance with the standards is checked by independent auditors at least once a year.

UTZ LABEL

UTZ is a sustainability program for coffee, cocoa, tea and hazelnut farmers, now part of the Rainforest Alliance. Farmers participating in the program learn how to grow their plants more efficiently, with better quality, with higher yields and most importantly: in a sustainable way.
During the program, farmers receive training on creating safe and healthy working conditions, as well as on compliance with environmental protection aspects. Thanks to this, they can achieve a better harvest, which provides them with a higher income, thus providing a fair living for themselves and their families. In this way, they improve their standard of living through their own efforts. Participating small producers agree to comply with the program's code of conduct.

FAIRTRADE LABEL

Fairtrade global organization provides better working and living conditions for small producers and workers in Africa, Latin America and also Asia, where crowned-pigeons live. More than 1.6 million small producers and workers benefit from stable minimum prices, support for community projects and the benefits of environmentally friendly cultivation.

Fairtrade standards are verified by independent organizations and regulate democratic organizational structures, environmental protection and safe working conditions.

In addition to the Fairtrade product labels, there is also the Fairtrade raw materials label, which designates the raw ingredients of a product, such as cocoa, sugar or cotton. These ingredients are grown and traded fairly and can be traded through volume compensation.

If a product consists of several ingredients, only the ingredient listed on the label is Fairtrade certified. For example, in the case of a chocolate bar, the cocoa or sugar used was purchased under Fairtrade conditions.

When you are in Asia

While you are on a holiday in Asia, you can help detect illegal wildlife trade using the Wildlife Witness smartphone app. This app enables tourists and locals to report wildlife trade incidents by taking a photo, pinpointing the location of the crime, and sending these crucial details to TRAFFIC. TRAFFIC is a leading NGO working globally on trade in wild animals and plants in the context of both biodiversity conservation and sustainable development. You can download this app on www.wildlifewitness.net.

Barred doves (Geopelia maugeus) at an Indosesian market

Spread information about illegal birdtrade

Help spread information about illegal bird trade among other tourists and locals in your home area. But not just for the trade in Asia, even in France and Mediterranean region songbirds are illegally captured and eaten.

Avoid posing and taking pictures with wild animals

A major issue in Southeast Asia is posing for photos with ‚cute' or exotic animals, an attraction often found on beaches and in night markets. Typically, someone approaches you with an exotic animal, places it in your arms, takes a Polaroid picture before you can refuse, and then demands payment, claiming it's for feeding the animal. Birds of prey and colourful lizards are frequent victims of this profitable trade, and the true origin and husbandry of them are often questionable.

Be conscious what food you try out

It is possible to eat rare or endangered species or meat that is obtained in an inhumane manner. This includes bird's nest soup, which is made from the nest built from the saliva of the white-nest swiftlets. When the birds have just finished the nests, people come and harvest them, not letting them lay eggs. Instead, opt for local dishes prepared with ingredients from sustainable farming and fishing practices.

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87. Blue-headed quail-dove *(Starnoenas cyanocephala)* by Enzo Franchini, Zoo Zürich
88. Mindanao bleeding heart *(Gallicolumba crinigera)*, AdobeStock
89. Nicobar pigeon *(Caloenas nicobarica)*, Shutterstock
90. Santa Cruz ground-dove *(Pampusana sanctaecrucis)*, Shutterstock
91. European turtle dove *(Streptopelia turtur)*, Shutterstock

WHAT CAN YOU DO?

92. Bird food by Lindsey Garrett, Pexels
93. Cat with prey by FurryFritz, AdobeStock
94. Bird imprint by Beth Woodrum, Wikimedia commons
95. Logo by Rainforest Alliance
96. Logo by RSPO
97. Logo by FSC
98. Logo by UTZ/ Rainforest Alliance
99. Logo by Fairtrade
100. Barred doves *(Geopelia maugeus)* at an Indosesian market by Richard Carey, AdobeStock

DID YOU KNOW THAT...?

101. Western crowned-pigeon *(Goura cristata)* by hit1912, AdobeStock
102. Victoria crowned-pigeon *(Goura victoria),* Shutterstock

Western crowned-pigeon-themed games and activities

SUMMARY TABLE

However, everyone's abilities and skills are different, we recommend an assistant of an adult for the activities highlighted in blue.

We would also like to ask you, that think about the nature, and print only the strictly necessary pages from the full document.

Activities and games	Age group (years old)				
	3-6	6-10	10-14	14-18	18+
Spice smelling game		x	x	x	x
Build a pigeon nest	x	x	x	x	x
Habitat loss game	x	x	x		
Pigeon crown finder	x	x	x	x	x
Poacher game	x	x	x	x	x
Can you save the crowned-pigeons?	x	x	x	x	x
Hidden animals	x	x	x	x	x
Test your crowned-pigeon knowledge!	x	x	x	x	x
Animals with headpieces – Who is who?	x	x	x		
Crowned-pigeon colouring	x	x	x		
Who are the parents? - hybridization game			x	x	
How do birds eat? – beak game		x	x	x	x
Sustainability label matching game				x	x

How good is your nose? - spice smelling game

The crowned-pigeon lives with very characteristic plants. During this game you can try to recognise them based on smell (blindfolded).

Can be played: 1-6 people

Materials and tools:

- glass container with lid (e.g. baby food jar)
- scarf
- spices from around New Guinea, if possible whole, freshly chopped:
  - *cardamom*
  - *black pepper*
  - *cinnamon*
  - *lemongrass*
  - *ginger*
  - *nutmeg*

For the little ones, a table where they can put an X in the correct place (they don't have to figure out what they smell, they have options to choose from).

Scent sample	Which place did it take in the line-up?
cardamom	
black pepper	
cinnamon	
lemongrass	
ginger	
nutmeg	

Photos for the glass jar or next to it:

CARDAMOM

BLACK PEPPER

CINNAMON

LEMONGRASS

GINGER

NUTMEG

Build a pigeon nest

Can be played individually and in groups

Materials and tools:

- branches, sticks, skewers
- chicken egg or wooden/plastic egg

Pigeons are famous for their simple nest-building habits and although the crowned-pigeon surpasses expectations when it comes to nest-building, most pigeon species are satisfied with crossing a few twigs.

A not really well constructed domestic pigeon nest

Be a smart pigeon, build a pigeon nest with as little material as possible. The goal is to use the least amount of twigs so that the egg does not come into contact with the ground or the surface under the nest. If we want to make the game more challenging, we can use skewers or straws.

Habitat loss game - crowned-pigeons in the rainforest

Can be played by 7-30 people

Materials

- A big blanket or sheet/ chalk
- Rainforest sounds

How to play

Put the blanket on the floor so everyone can fit on it. This will represent the rainforest.

The players will be the crowned-pigeons foraging on the forest floor. They can do this until they hear the rainforest sound with the birds chirping. When the music stops, they must seek shelter and quickly stand on the blanket. They can help each other to fit on the blanket, but the aim is for everyone to fit in the ‚forest'. However, illegal loggers are here to destroy the forest, and the habitat is shrinking. After every time the music stops, the sheet must be folded in half. The goal is to keep as many crowned-pigeons alive as possible. Anyone who cannot stand on the blanket or falls from it is out of the game.

Variation 1.: the game can be played without a blanket/sheet, in which case we draw a large shape on the ground with chalk, and when the music stops, we cut it in half and redraw the new, smaller borders.

Variation 2.: we don't use bird sounds; players can seek shelter on a signal (e.g., clapping hands or chainsaw sound).

Pigeon crown finder

Can be played by 1-2 people

Can be played indoors and outdoors
I invite you to a fun game of observation!
Look around your environment. Can you find something that resembles the crown of the crowned-pigeon?
It could be a shadow, a part of a plant, someone's hair,… anything that can replace the pigeon's jewel in the picture!

Cut the picture below and hold it up to replace the crown with what you see:

Poacher game

They caught a poacher, what could he have smuggled?

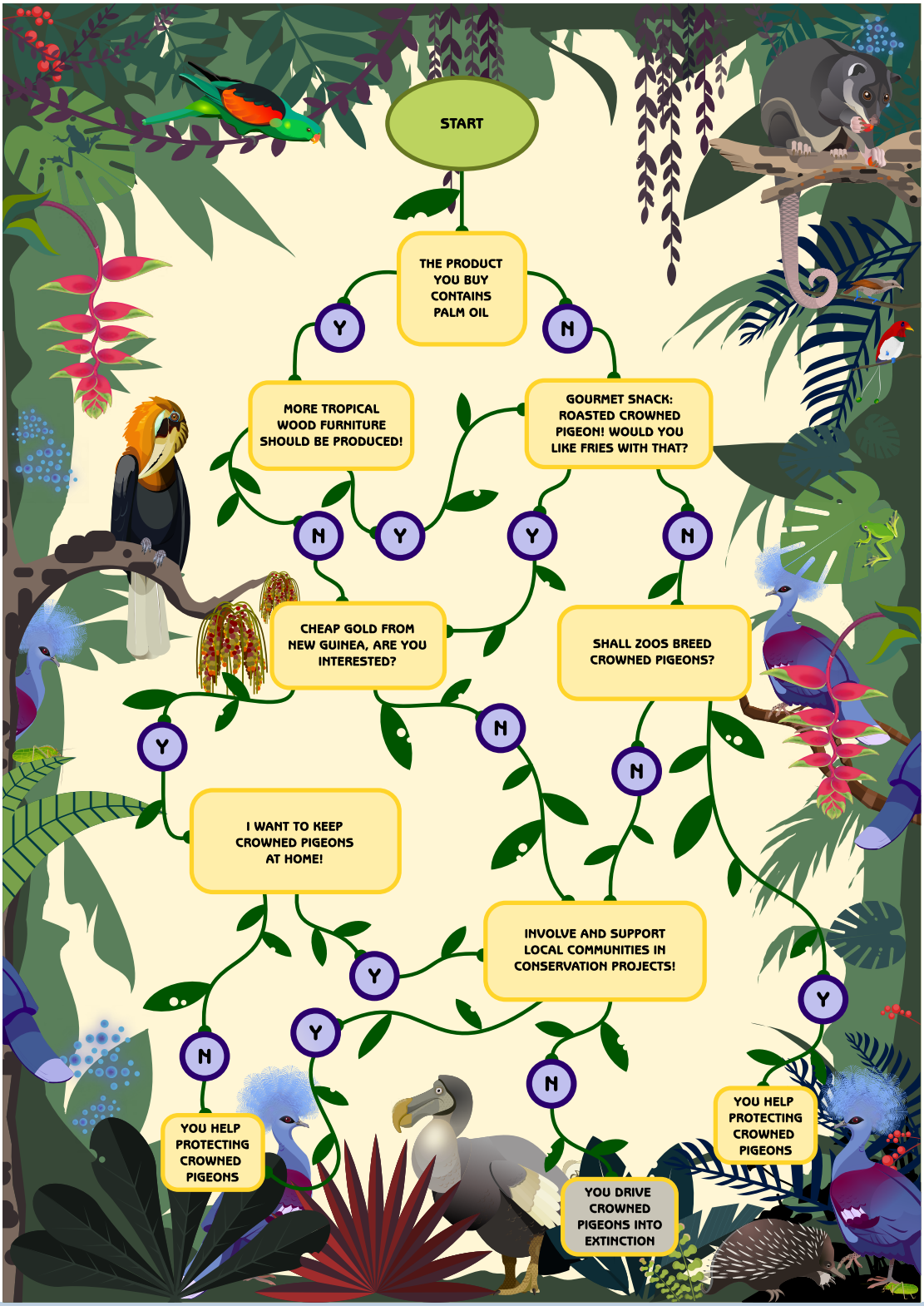
They caught a poacher, but unfortunately, they only found his empty bag, without animals. Could he be connected to the recently internationally unravelled network that smuggled crowned-pigeons from New Guinea to Europe?
The following feathers were hiding in his bag:

If you feel like it, match which feather belongs to which bird!

flamingo, peacock, Nicobar pigeon, guinea fowl, emu, hyacinth macaw, budgerigar, cassowary, Western or Scalet's crowned-pigeon, grey junglefowl, great spotted woodpecker

Can you save the crowned-pigeons?

Plantations, agriculture, mining, deforestation, and poaching all threaten the integrity of New Guinea. Now it depends on your decisions, what will be the fate of the crowned-pigeons.



Hidden animals

Can be played by 1-2 people

65% of the island of New Guinea is covered by forest, which offers a great hiding place for the animals living there. How much so? You can test this too. Find the following species in the picture:

Western Crowned Pigeon *(Goura cristata)*

9 birds are hiding in the picture.

Papuan Hornbill *(Rhyticeros plicatus)*

Most hornbills are monogamous, once they find a mate, they stay with them for life. Our bird is still a bachelor, **sitting alone** on a branch. You can recognize him by his light brown head, unlike the female, who is dark colored.

Ground Cuscus *(Phalanger gymnotis)*

Ground cuscuses are strange marsupials. While they usually feed on trees, unlike other cuscus species, they spend their days in burrows dug in the ground, hence their name. They lead a solitary lifestyle. In the picture, you will only find **one animal** munching on fruit.

Short-beaked Echidna *(Tachyglossus aculeatus)*

What makes one of the strangest mammals special is that despite being a mammal, it reproduces with a soft-shelled egg. The reason for laying eggs is simply that the ancient mammal-like reptiles and early mammals - like the majority of reptiles - originally laid eggs, and they separated from the other mammals very early in the course of evolution, thus retaining this characteristic. They dig very skillfully, and their diet consists largely of ants, beetles, larvae, and worms. In the picture, you will find **one animal** searching for food.

Red-winged Parrot *(Aprosmictus erythropterus)*

Although this species is not specifically a jungle dweller, it prefers drier habitats, it can also be found on the island of New Guinea. Like other parrots, they nest in cavities, the nest consists of 3-6 eggs. Only the female incubates, but from the age of 2 weeks, the male takes on most of the chick rearing. The chicks fly out at about 5 weeks of age, but then stay with the parent pair for a much longer time. **One male** is hiding in the picture.

Southern Cassowary *(Casuarius casuarius)*

The cassowary is the heaviest flightless bird after the ostrich. Its feathers are almost hair-like, and its dinosaur-like appearance is due to its long, clawed legs and its helmet. The cassowary's menu consists almost entirely of fruit, which they swallow whole. Most fruit seeds leave the bird almost untouched with a good dose of manure, so this bird is the gardener of the rainforests. Unlike most birds, in their case, the male incubates the eggs and raises the chicks. You can find **one animal** in the picture.

Giant Katydid *(Siliquofera grandis)*

These giant leafhoppers can reach up to 13 cm (5 in) in length. Their food consists of plants, mainly leaves, which they consume at night. They are peaceful arthropods, their appearance resembles a leaf, so despite their large size, they easily blend into their environment. It's not easy to discover them, can you find all **7 animals** in the picture?

King Bird of Paradise *(Cicinnurus regius)*

The king bird of paradise is also called a living gem. The males are recognizable by their brilliant red colour and two long, ornate, wire-like tail feather shafts, and the disc-like, green, spiral feathers sitting on them. The females are brownish in colour, but their legs also shine in a bright blue colour. The male performs a complex courtship dance for the female: first, he sits vertically on a branch, flutters his wings, then holds his body parallel to the branch, spreads his chest feathers, and raises his tail feathers above his head during the dance. Then he swings both his tail feathers and his body to the side, and finally hangs upside down on the branch with closed wings, and swings like a pendulum. You can discover **a female and a male** in the picture.

New Guinea Tree Frog *(Litoria infrafrenata)*

These frogs are among the world's largest tree frogs with their size of 10-14 cm (4-5.5 in). Their color on the back is beautiful bright green, although they can also take on a brownish color due to the temperature. Their peculiar identifying feature is the white stripe around their mouth. Their diet consists of arthropods, which they mainly catch at night. Like all amphibians, they are also able to breathe through their skin. You can discover **3 animals** in the picture.

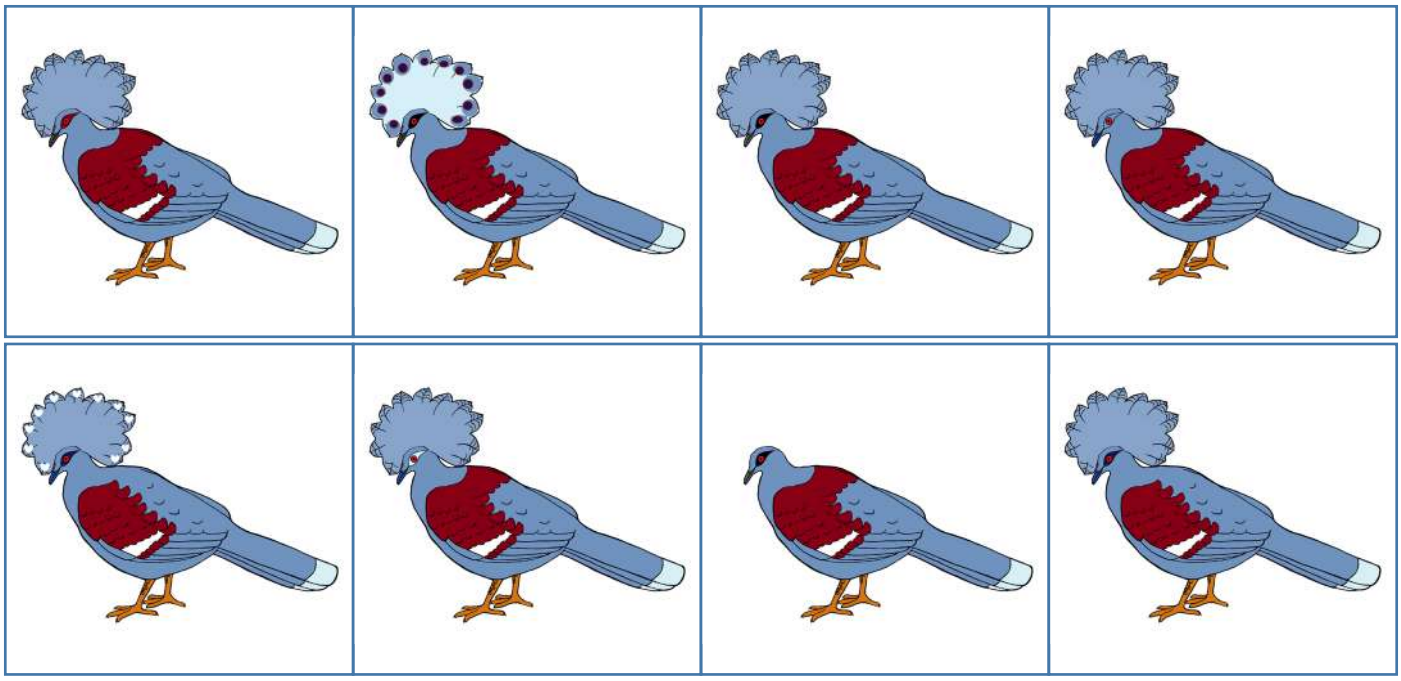
Test your crowned-pigeon knowledge!

I. Which crowned-pigeon species do the following statements apply to? Put an X in the appropriate column(s)!

	Western crowned-pigeon *(Goura cristata)*	Victoria crowned-pigeon *(Goura victoria)*	Sclater's crowned-pigeon *(Goura sclateri)*	Scheepmaker's crowned-pigeon *(Goura scheepmakeri)*
The crown on its head is a different colour from the other species				
Its chest is maroon				
Its distribution area is the westernmost on the island of New Guinea				
They were considered to be one species for a long time				
It is the largest of the four species				
Its chest is blue				
Habitat loss is the greatest threat to it				
Its scientific name comes from the name of a Dutch bird dealer				

II. Based on the following description, choose from the drawings which one could be the western crowned-pigeon!

The feathers of its crest are not edged in white. The maroon colour continues on its back. Its chest is blue. It has a black eye stripe.



III. True-False: Decide which statements about crowned-pigeons are true and which are false!

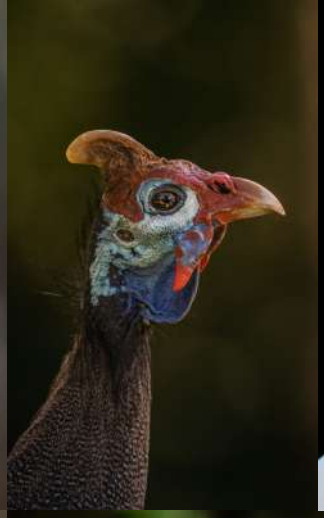
Males and females are roughly the same: **TRUE – FALSE**
The blue color observed in crowned-pigeons is common
in the animal kingdom: **TRUE – FALSE**
There is always a maroon, almond-shaped spot around the eyes: **TRUE – FALSE**
Their distribution is greatly threatened by habitat loss: **TRUE – FALSE**
They do not have uropygial glands: **TRUE – FALSE**
Their main food is hard boiled eggs: **TRUE – FALSE**
They often lay 1 white egg: **TRUE – FALSE**
They live on the island of New Guinea: **TRUE – FALSE**

IV. Various human activities threaten the habitat of crowned-pigeons. Based on the pictures, list a few!

Animals with headpieces – Who is who?

Many animals wear crowns and headpieces on their heads. Who are they? Match the names with the animals!

western crowned-pigeon
northern cardinal
Eurasian hoopoe
California quail
lion
peacock
red-whiskered bulbul
secretary bird
southern cassowary
helmeted guineafowl
salmon-crested cockatoo
red deer
Hercules beetle

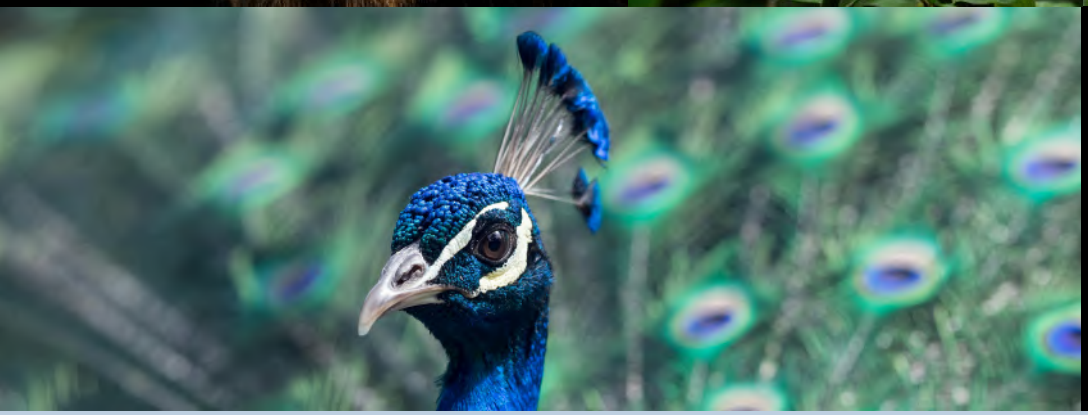









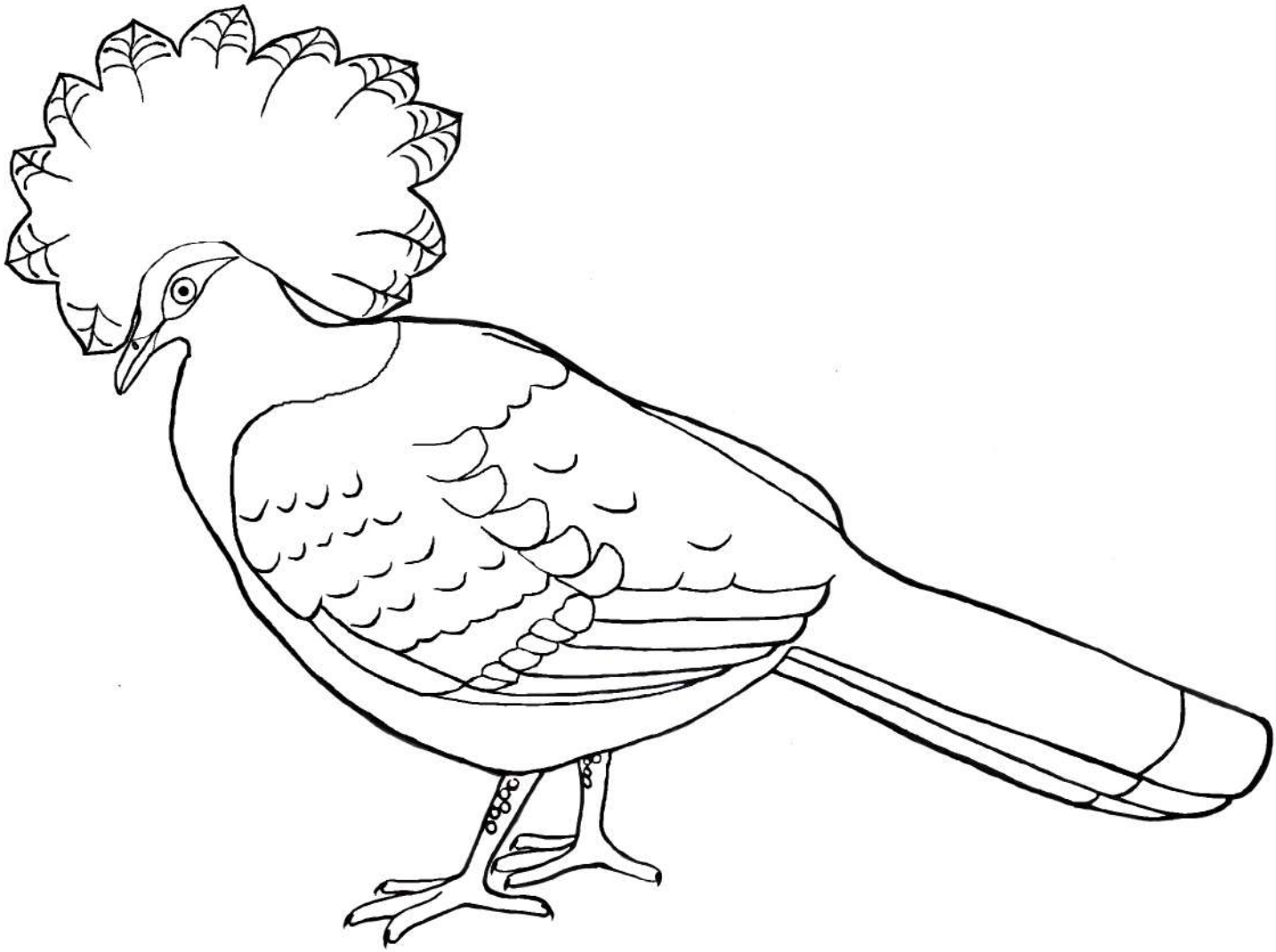




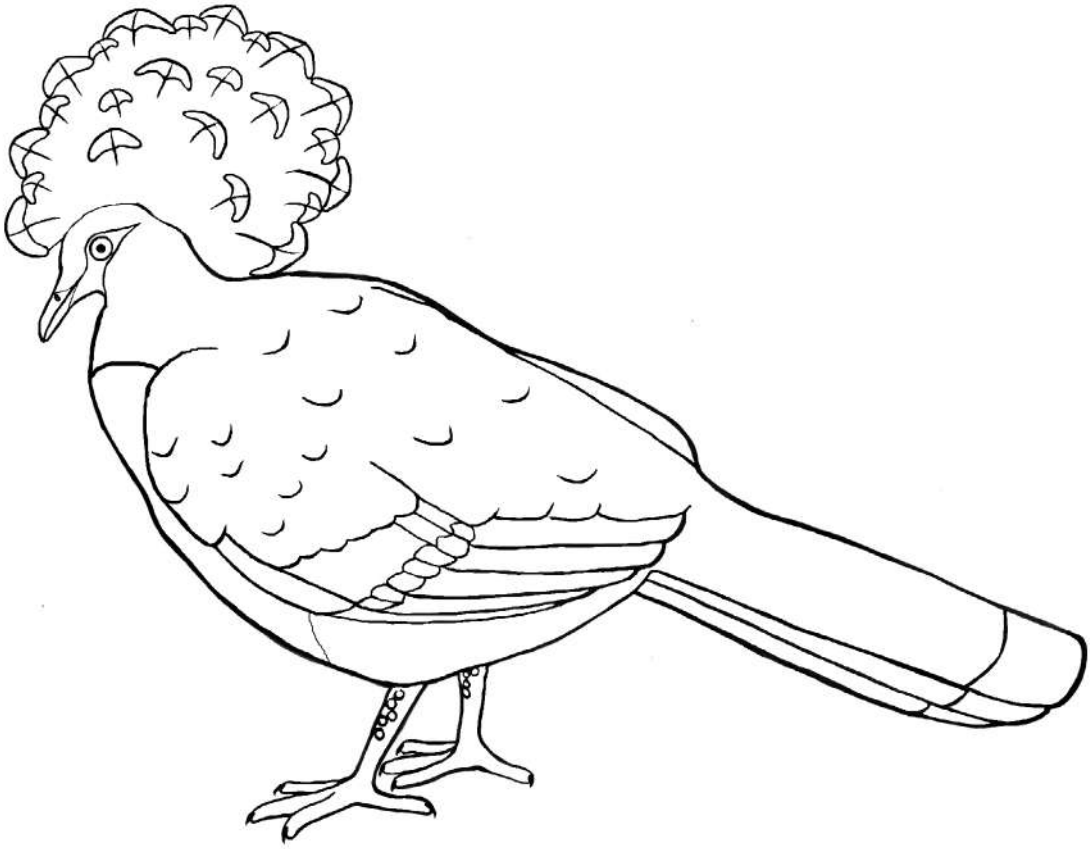

Colour the three crowned-pigeon species

Pay attention to the correct colours!

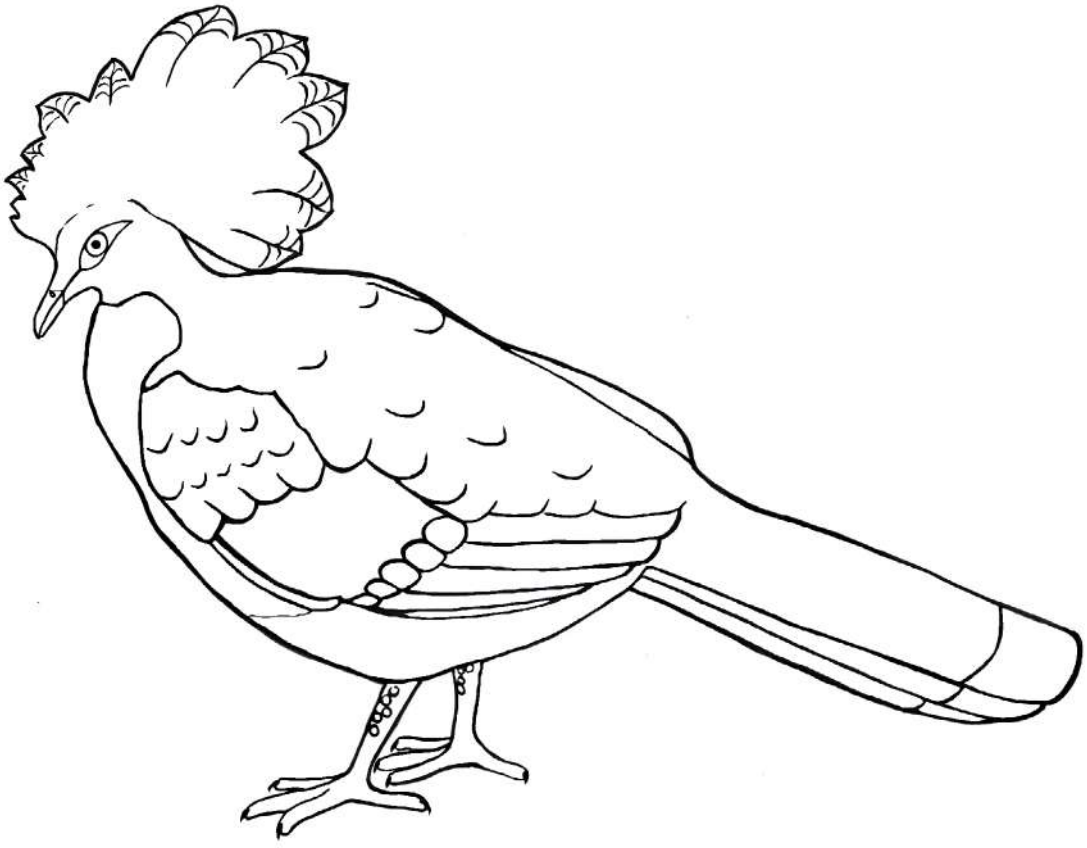
Western Crowned Pigeon



Victoria crowned-pigeon



Sclater's crowned-pigeon



Who are the parents? - hybridization game

In the past, when zoos did not pay enough attention to species conservation, unfortunately several species of crowned-pigeons were kept together. Since different species are evolutionarily close to each other, it has happened that individuals of two different species have mated and hatchlings were born.

Help zookeepers guess which two of the three EEP species (Western, Victoria and Sclater's crowned-pigeon) could have been the parents of the following hybrid animals. If you need, go back and see which species characteristics can be used to distinguish different species of crowned-pigeons.

1.

2.

3.

How do birds eat? – Beak game

Can be played by 5-25 people (ideal with 15 people)

Materials and tools: models of beaks of different species of birds, photos of the same birds

Let's get started:

Preparations:

- The names of the birds in the game on small notes and their photo
- Imitations of the beaks of different bird species
- The model of the food consumed by the given bird species

The game:

1. We divide the participants into as many groups as there are bird species.
2. Each team receives a photo, based on which they must identify the bird's name.
3. Once they have found everything, they can test the function of the beaks with the help of the models. Let's switch teams after a while!
4. If we made several beak models, the teams could try out what it's like to try to peck some food models with a different beak type.
5. We can also change the game so that each team tries to pick up all types of food in a given time with its own beak model.

bird	beak type	working mechanism	diet	imitations of the beak	imitations of the diet	game: complete the following tasks in a given amount of time:
flamingo	strainer beak	filtering small food items from water	algae, small seeds, tiny crustaceans, plant parts	small aquarium net	bowl with water and smaller types of cereals	filter as much cereal as possible and transfer it to another bowl
European goldfinch	cone beak	mostly for picking seeds and peeling them	mostly seeds, buds and insects seasonally	two small paper cones, which we can pull on our thumb and index finger	a handful of sunflower or other seeds	transfer as many seeds as possible to another bowl
crowned-pigeon	modified cone beak	picking up seeds, fruits and small insects	seeds, fruits, plant parts, insects	flat type of tweezers	diced apple, cooked peas, raisins, seeds and 1-2 cm long strings mixed together	pick as many food items as possible and transfer them to a different bowl
hummingbird	probing beak	sipping nectar from flowers	nectar	straw	Two small containers, one is filled with water, the other one is empty	hold the straw in the water, then cover the top and transfer as much water as possible to the other container
curlew	probing beak	taking small invertebrates out from the mud	small invertebrates	bbq tongs	water and soil mixed in a bowl, 4-5 cm long pieces of strings mixed in it	try to find as many strings as possible and collect them in another bowl with the least amount of mud
swift	short beak, big mouth	catching flying insects while the bird is in the air	flying insects	small aquarium net	smaller cotton balls	throw the cotton balls into the air and try to catch them with the net
sparrowhawk	hooked beak	shredding and tearing meat	smaller mammals, birds	two forks, one as beak, one as talon	a banana	try to peel the banana and tear it into pieces
Eurasian wren	short, pointy beak	catching insects	larvae of butterflies, moths, flies, small insects, spiders	small, pointy tweezers	short, 1 cm long pieces of strings	try to pick the strings one by one and collect them in a different bowl








SUSTAINABILITY LABEL MATCHING GAME

You can do a lot to protect the habitat of crowned-pigeons! How? If you recognize and choose products with these sustainability labels!
Match the pictures! Which logo belongs to which product?

UTZ Certified

FSC

RAINFOREST ALLIANCE FOREST ALLIES

CERTIFIED SUSTAINABLE PALM OIL ™ RSPO

FAIRTRADE ®

List of photographs and illustrations - crowned-pigeon-themed games and activities

How good is your nose? - spice smelling game

1. Cardamom by T. R. Shankar Raman, Wikimedia commons
2. Black pepper by Kozhikode, Wikimedia commons
3. Cinnamon by David J. Stang, Wikimedia commons
4. Lemongrass by Mokkie, Winimedia commons
5. Ginger by Dguendel, Wikimedia commons
6. Nutmeg by Fpalli, Wikimedia commons

Build a pigeon nest

7. Pigeon nest by alvaro, AdobeStock
8. Photo by Csilla Beke
9. Photo by Csilla Beke
10. Photo by Csilla Beke

Pigeon crown finder

11. Photo by Borbála Kocsis

Poacher game

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20. Budgerigar by wwarby, Pexels
21. Nicobar pigeon by Rob Potter, Unsplash
22. Crowned-pigeon, AdobeStock
23. Cassowary by seiichiro, Unsplash

Test your crowned-pigeon knowledge!

24. Logging by Wakx, Wikimedia commons
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26. OkTedi mine in New Guinea, by Dr. Blofeld, Wikimedia commons
27. Spread of infrastructure in district Tawau Sabah, loggin trucks by CEphoto, Uwe Aranas, Wikimedia commons

Animals with headpieces - Who is who?

28. Secretary bird by Rolf Dietrich Brecher, Wikimedia commons
29. Helmeted guineafowl by Asher Pardey, Unsplash
30. Salmon-crested cockatoo by Len Charnoff, Wikimedia commons
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33. Cassowary by David Clode, Unsplash
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37. Red-whiskered bulbul by Nashad Abdu, Unsplash
38. Red deer by Gabriele Brancati, Pexels
39. Peacock by Tj Holowaychuk, Unsplash
40. Western crowned-pigeon, Shutterstock

How do birds eat? - beak game

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42. Eurasian wren by Alexis Lours, Wikimedia commons
43. Curlew by Petr Ganaj, Pexels
44. Eurasian sparrowhawk by Sharp Photography, Wikimedia commons
45. European goldfinch by Francis C. Franklin, Wikimedia commons
46. Flamingo, Pexels
47. Hummingbird by frank Cone, Pexels
48. Crowned-pigeon Christophe95, Wikimedia commons

Sustainability label matching

49. -56 Illustrations designed by Freepik and by brgfx jemastock, vectorpocket, jeamstock and brgfx on Freepik, and by granate-artist132016 on Vecteezy

Solutions for the games and activities

Poacher game

They caught a poacher, what could he have smuggled?

FLAMINGO

PEACOCK

NICOBAR PIGEON

GUINEA FOWL

EMU

HYACINTH MACAW

BUDGERIGAR

SOUTHERN CASSOWARY

WESTERN OR SCALTER'S CROWNED-PIGEON

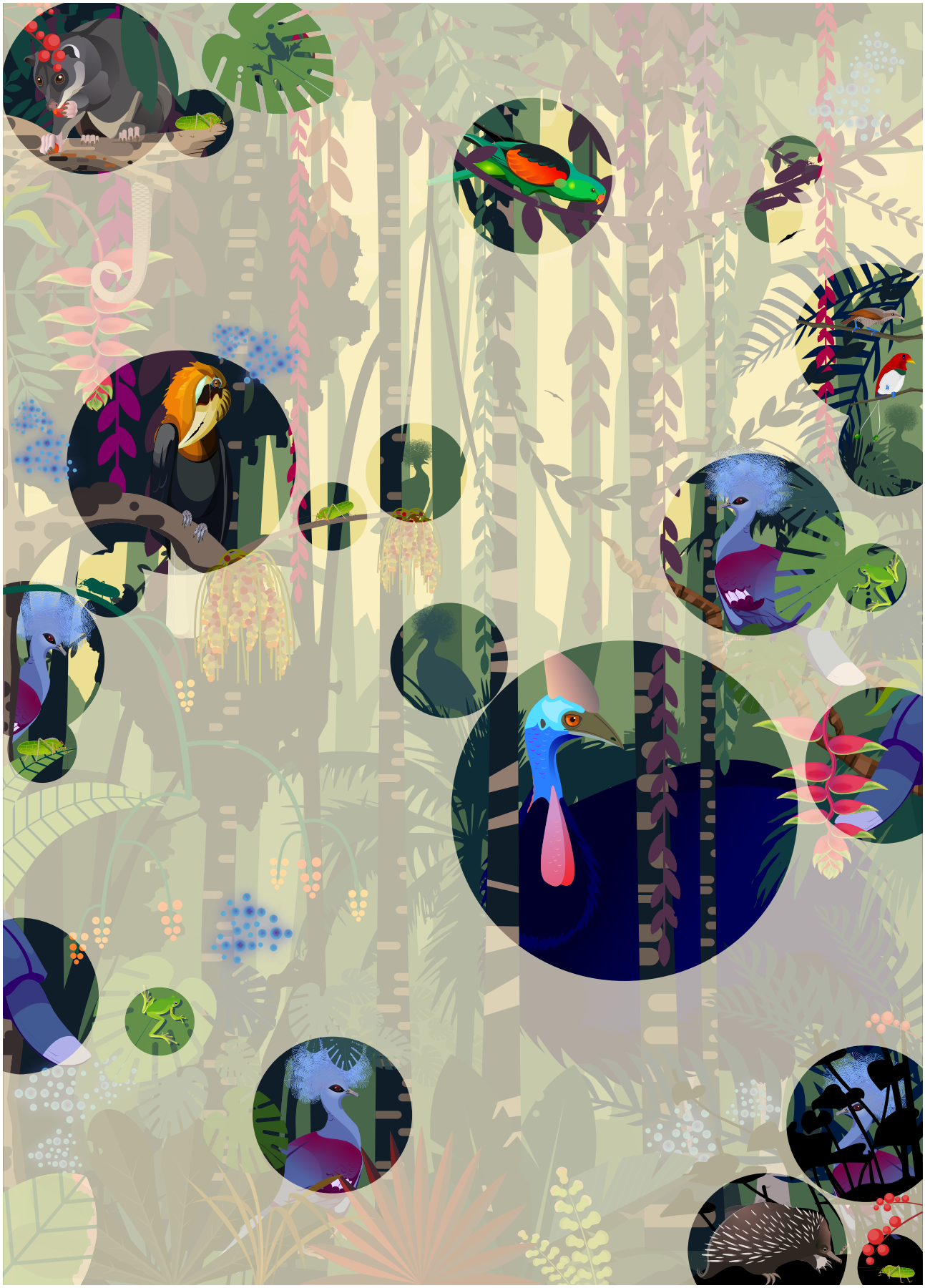
GREY JUNGLEFOWL

GREAT SPOTTED WOODPECKER

Can you save the crowned-pigeons?

The product you buy contains palm oil. - no
More tropical wood furniture should be produced! - no
Gourmet snack: roasted crowned-pigeon! Would you like fries with that? - no
Cheap gold from New Guinea, are you interested? - no
Shall zoos breed crowned-pigeons? - yes
Involve and support local communities in conservation projects. - yes
I want to keep crowned-pigeons at home! - no

Hidden animals



Test your crowned-pigeon knowledge!

I. Which crowned-pigeon species do the following statements apply to? Put an X in the appropriate column(s)!

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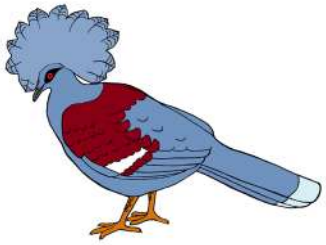
The crown on its head is a different colour from the other species		X		
Its chest is maroon		X	X	X
Its distribution area is the westernmost on the island of New Guinea	X			
They were considered to be one species for a long time			X	X
It is the largest of the four species		X		
Its chest is blue	X			
Habitat loss is the greatest threat to it	X	X	X	X
Its scientific name comes from the name of a Dutch bird dealer				X

II. Based on the following description, choose from the drawings which one could be the western crowned-pigeon!

The feathers of its crest are not edged in white. The maroon colour continues on its back. Its chest is blue. It has a black eye stripe.

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Males and females are roughly the same: **TRUE** – **FALSE**
The blue color observed in crowned-pigeons is common
in the animal kingdom: **TRUE** – **FALSE**
There is always a maroon, almond-shaped spot around the eyes: **TRUE** – **FALSE**
Their distribution is greatly threatened by habitat loss: **TRUE** – **FALSE**
They do not have uropygial glands: **TRUE** – **FALSE**
Their main food is hard boiled eggs: **TRUE** – **FALSE**
They often lay 1 white egg: **TRUE** – **FALSE**
They live on the island of New Guinea: **TRUE** – **FALSE**

IV. Various human activities threaten the habitat of crowned-pigeons. Based on the pictures, list a few!

Logging

Agriculture

Mining

Infrastructure development

Animals with headpieces – Who is who?

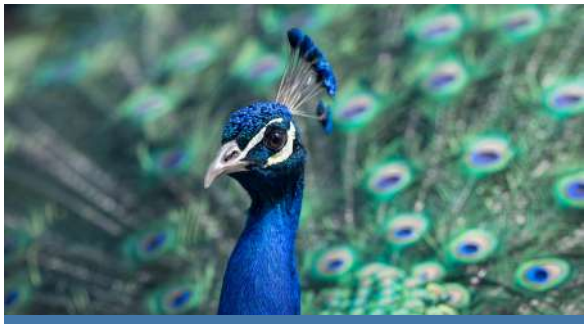
WESTERN CROWNED-PIGEON

NORTHERN CARDINAL

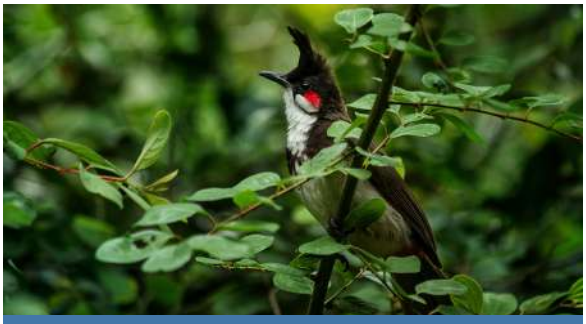
EURASIAN HOOPOE

CALIFORNIA QUAIL

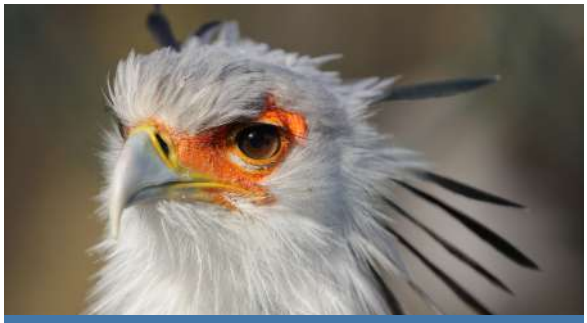
LION



PEACOCK



RED-WHISKERED BULBUL



SECRETARY BIRD

HELMETED GUINEAFOWL

RED DEER

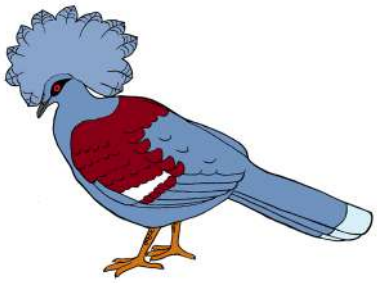
SOUTHERN CASSOWARY

SALMON-CRESTED COCKATOO

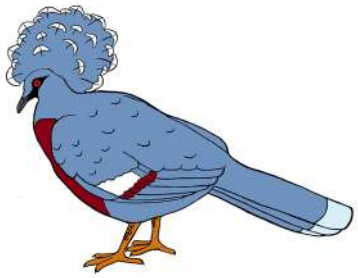
HERCULES BEETLE

Colouring solutions

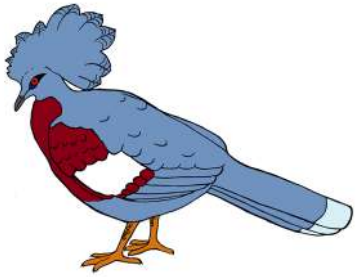
Western crowned-pigeon



Victoria crowned-pigeon



Sclater's crowned-pigeon



Who are the parents? - hybridization game solutions

1. Western crowned-pigeon (maroon shoulder belt that crosses the back, maroon patch on wing coverts, completely blue crown, tip of the tail feathers is white, black mask around eyes) and Sclater's crowned-pigeon (completely blue crown, maroon chest, maroon patch on wing coverts, tip of the tail feathers is white, almond-shaped black mask around the eyes)

2. Sclater's crowned-pigeon (maroon spot on wing cover, red chest, tip of the tail feathers are white, almond-shaped black mask around the eyes) and Victoria crowned-pigeon (white colour in crown, maroon chest)

3. It is a bit tricky, here we can not narrow it down to two species: Sclater's crowned-pigeon (completely blue crown), Western crowned-pigeon (completely blue crown), Victoria crowned-pigeon (there is no maroon spot on the wing coverts, maroon chest, the end of the tail feathers is grey, black mask around the eye that runs under the beak)

SUSTAINABILITY LABEL MATCHING GAME SOLUTION

List of photographs and illustrations - crowned-pigeon-themed games and activities and their solutions

Poacher game

1. -10. Photo by Boglárka Takács-Kocsis

Test your crowned-pigeon knowledge!

11. Logging by Wakx, Wikimedia commons
12. Oil palms by Richard Carey, AdobeStock
13. OkTedi mine in New Guinea, by Dr. Blofeld, Wikimedia commons
14. Spread of infrastructure in district Tawau Sabah, loggin trucks by CEphoto, Uwe Aranas, Wikimedia commons

Animals with headpieces - Who is who?

15. Western crowned-pigeon, Shutterstock
16. Northern cardinal by Tina Nord, Pexels
17. Eurasian hoopoe by Rajukhan Pathan, Pexels
18. California quail by Gary Kramer, Wikimedia commons
19. Lion by alexas fotos, Pexels
20. Peacock by Tj Holowaychuk, Unsplash
21. Red-whiskered bulbul by Nashad Abdu, Unsplash
22. Secretary bird by Rolf Dietrich Brecher, Wikimedia commons
23. Cassowary by David Clode, Unsplash
24. Helmeted guineafowl by Asher Pardey, Unsplash
25. Salmon-crested cockatoo by Len Charnoff, Wikimedia commons
26. Red deer by Gabriele Brancati, Pexels
27. Hercules beetle by Bruno P. Ramos, Wikimedia commons

Sustainability label matching

28 -36 Illustrations designed by Freepik and by brgfx jemastock, vectorpocket, jeamstock and brgfx on Freepik, and by granate-artist132016 on Vecteezy

List of photographs

37. Victoria crowned-pigeon *(Goura victoria)*, Shutterstock

Crowned-pigeon themed handcraft ideas

SUMMARY TABLE

However, everyone's abilities and skills are different, we recommend an assistant of an adult for the activities highlighted in blue. Please, always be cautious when using sharp objects and hot glue.

We would also like to ask you, that think about the nature, and print only the strictly necessary pages from the full document.

Handcraft ideas	Age group (years old)				
	3-6	6-10	10-14	14-18	18+
Making a crowned-pigeon stamp	x	x	x	x	x
Making a crowned-pigeon figure		x	x	x	x
Seed ball from recycled paper	x	x	x	x	x
Bird ringing bracelet	x	x	x	x	x
Paper thread art		x	x	x	x
Grass head	x	x	x	x	x

Make a crowned-pigeon stamp!

Materials and tools:

- Cork or potato
- Sharp knife
- Cutting board
- Foam sheet
- Glue
- Paint (appropriate for the surface you are stamping on)
- Surface to stamp on (paper, textile, etc.)

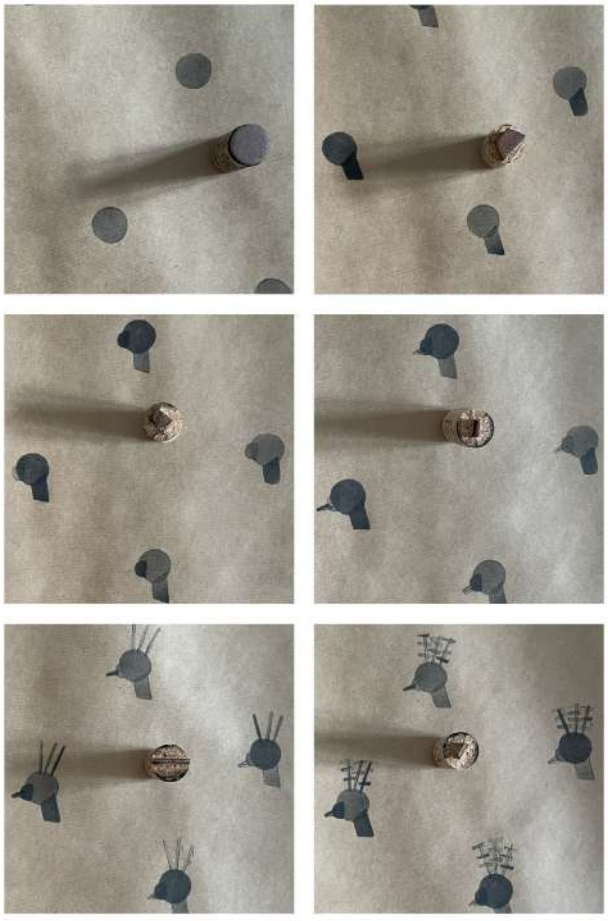
Let's get started!

1. Carefully cut out the following shapes from the cork and also from the decorative rubber: full circle, small semi-circle, trapezoid, long strip, and a short strip.
2. Glue each rubber shape to the same cork shape, and wait until it dries. You will have five different shapes of stamp.
3. You can use it by pressing it into the paint, making from the simple individual shapes a more complex pattern, such as a crowned-pigeon. Feel free to experiment with the shapes!

Or

4. Carefully cut the potato in half, then cut out the desired shapes from its surface.
5. You can use it by pressing it into paint!

If you like the technique, you can make wrapping paper, greeting/postcards, canvas bags, and anything unique with it, only your imagination sets the limit. Have the coolest special animal set for yourself!



Making a crowned-pigeon figure

Would you like to have a crowned-pigeon at home? You can make a figure version of it, and we'll show you how.

Materials and tools needed:

- 2 corks, preferably the wider, champagne type
- 24 cm wire
- Felt materials (blue, maroon, white, grey, and black)
- 2 small red beads
- Blue chenille ball
- Small blue lace
- Needle and thread
- Templates
- Pencil or anything that can mark on felt
- Liquid glue (a glue gun is best)
- Scissors

Let's get started!

1. The base of the crowned-pigeon is a cork. Since the pigeon's body tapers at the back, you need to carve the back of the cork a bit. Ask an adult for help with this!
2. Attach the twisted wire to this, forming the neck part (see below).
3. Glue the chenille ball to the wire; this will be the bird's head. If you feel the head is too small, wrap more blue yarn around it to increase the size. However, a small head is not a problem, as the crowned-pigeon's head is relatively small compared to its body (see below).
4. **Using the templates shown below**, cut out your own patterns, following the appropriate colours! Use a light pencil to outline on dark material. The template is enough for two birds.
5. "Dress up" the pigeon: glue the two simplified bird shapes to the sides of the bird.
6. Make a crown from the blue lace, gather the bottom with needle and thread, and glue it to the bird's head. If you don't have lace, you can make a great crown from blue paper (see below)!
7. Glue the appropriate felt strips to the bird's back and belly (see below).
8. Continue gluing with the wings: glue the white and maroon wing covers to both wings, then attach both wings to the sides of the body (see below).
9. Glue the tail feathers to the tail strip, then attach the bird's tail to the strip running along the back (see below).
10. Glue a circular piece of felt to the back of the bird to cover the exposed part of the cork.
11. For the beak, make a cone shape from the cut-out felt, which you can secure with glue or a bit of thread to prevent it from unrolling. Glue this to the bird's head. You can also make the beak from cardboard; the important thing is that it stays in place once attached.
12. Next, glue the red beads to the appropriate places on the black eye spots, then attach them to the bird's head (see below).
13. If you still have patience, you can make legs from twisted wire. If you're tired, a simpler solution will do – place the pigeon on a small branch and attach it to a cork. Before gluing it, find the balance point, as the bird will only stay steady if placed at this point.

2.

3.

5.

6. A

6. B

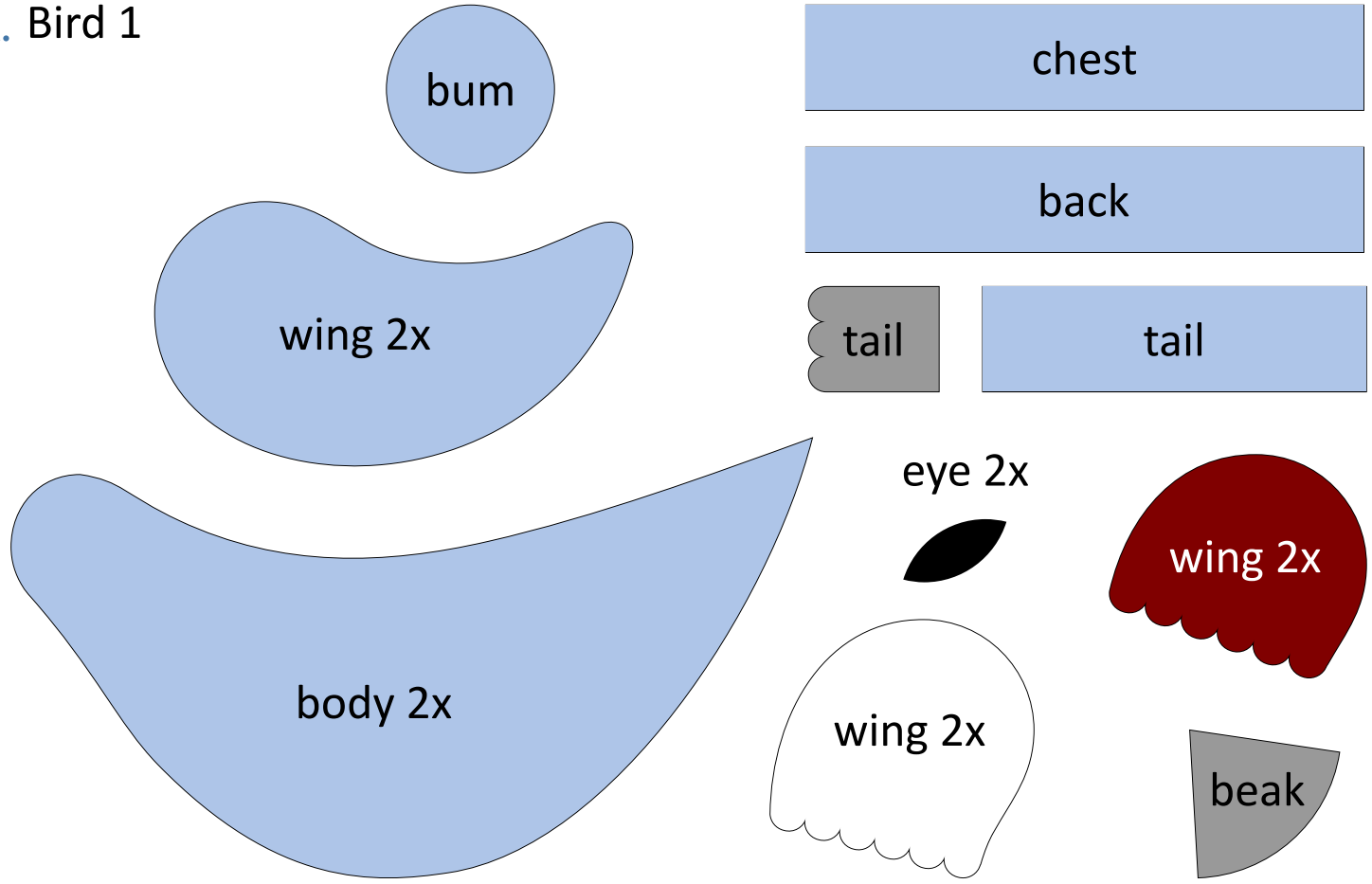
7.

8.

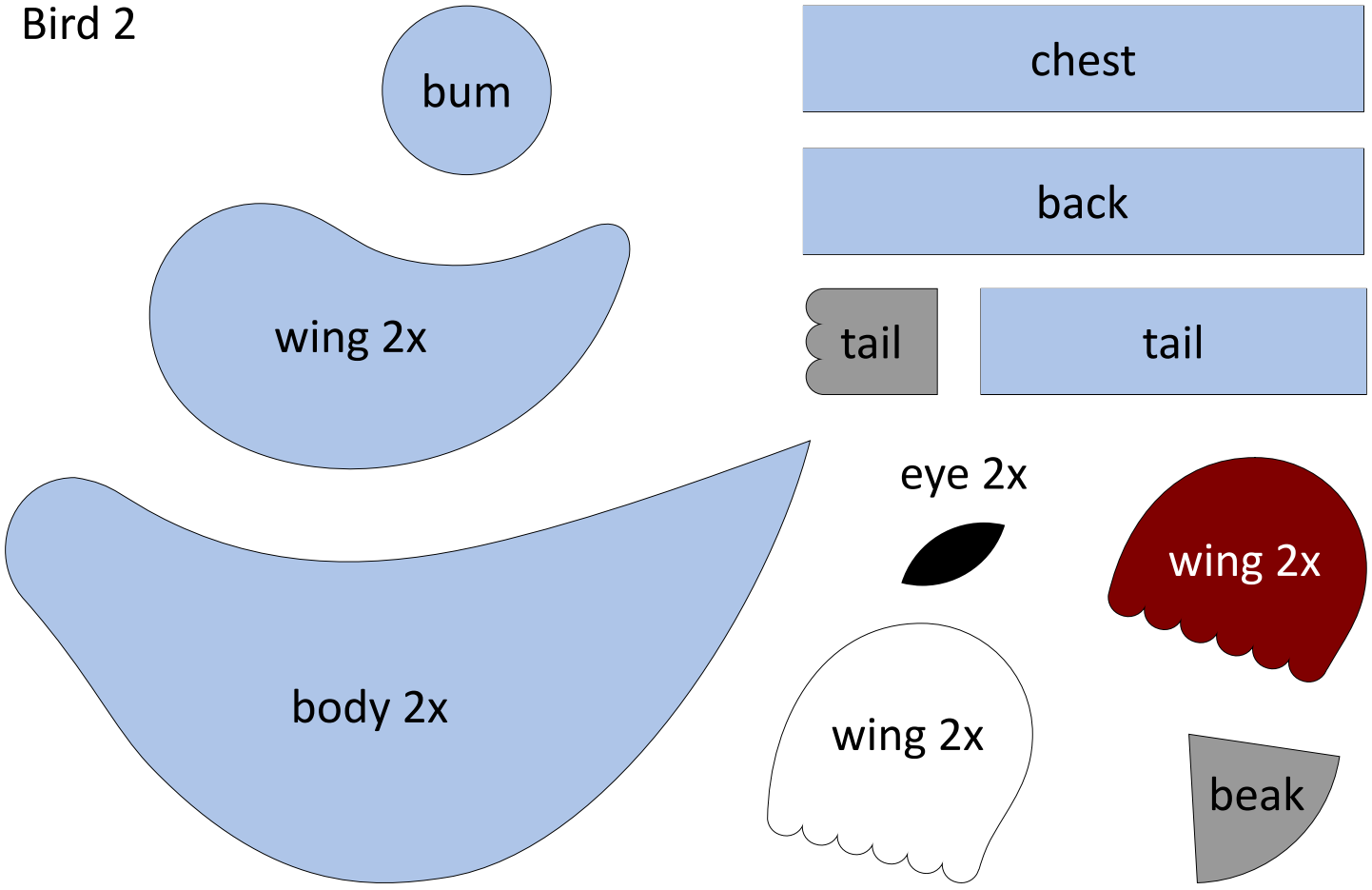
9.

12.

4. Bird 1



Bird 2



Make a seed ball from recycled paper!

You probably often have clean paper waste at your place. A very exciting way to reuse it is to make papier mache out of it, into which you can put the smaller seeds that the crowned-pigeon also eats.

Materials and tools:

- Torn up paper
- Small seeds, which even a crowned-pigeon would eat e.g. grass seed, wheat, sorghum, millet
- Maybe an ice cream stick that you can build into the seed ball and write the name of the plant on it

Let's get started!

All you have to do is:

1. Tear the paper into small pieces.
2. Soak it overnight in hot water.
3. Grind it with a blender.
4. When the pulp is ready, take a handful in your hand, squeeze out the excess water (but don't let it be too dry!), then knead in the small seeds that the crowned-pigeon also favours.
5. Flatten and shape the pulp into any form between your hands, leave it like that or stick it around the ice cream stick if you want. When you are satisfied, let it dry in a well-ventilated place for a day.
6. Give the balls as a gift, or plant them yourself.

Bird ringing bracelet

Birds often have rings, which makes them unique. Be unique too, and make your own bird ring-inspired bracelet!

Materials and tools:

- Wooden spatula (available in pharmacies) or wooden ice cream stick (can be sterilized by cooking)
- Container for soaking
- Water
- Glass for shaping
- Coloured felt-tip pens for decoration

Variations: it can also be decorated with paint, nail polish, decoupage technique, thread wrapping, etc.

Let's get started!

1. Soak the sticks in water.
2. When the wood has become flexible enough, bend it and put it in an empty glass.
3. Wait until it completely dries.
4. Decorate it as you like.

If you choose the bird ringing theme, give a bright base colour to the stick, then write a short letter code and a number series that is important to us in a different colour.

Valentine's Day version: In case of a couple, we can write our own code (e.g., KATE 20010601) under our sweetheart's (e.g.: PETER 19981119), so it is clear to the "researchers" whom we paired up with.




Paper thread art

Paper thread art is an incredibly simple and inspiring way to create creative inscriptions and images by embroidering on a perforated cardboard sheet based on a given pattern. Here, we present a work inspired by a victoria crowned-pigeon, but you can choose any species.

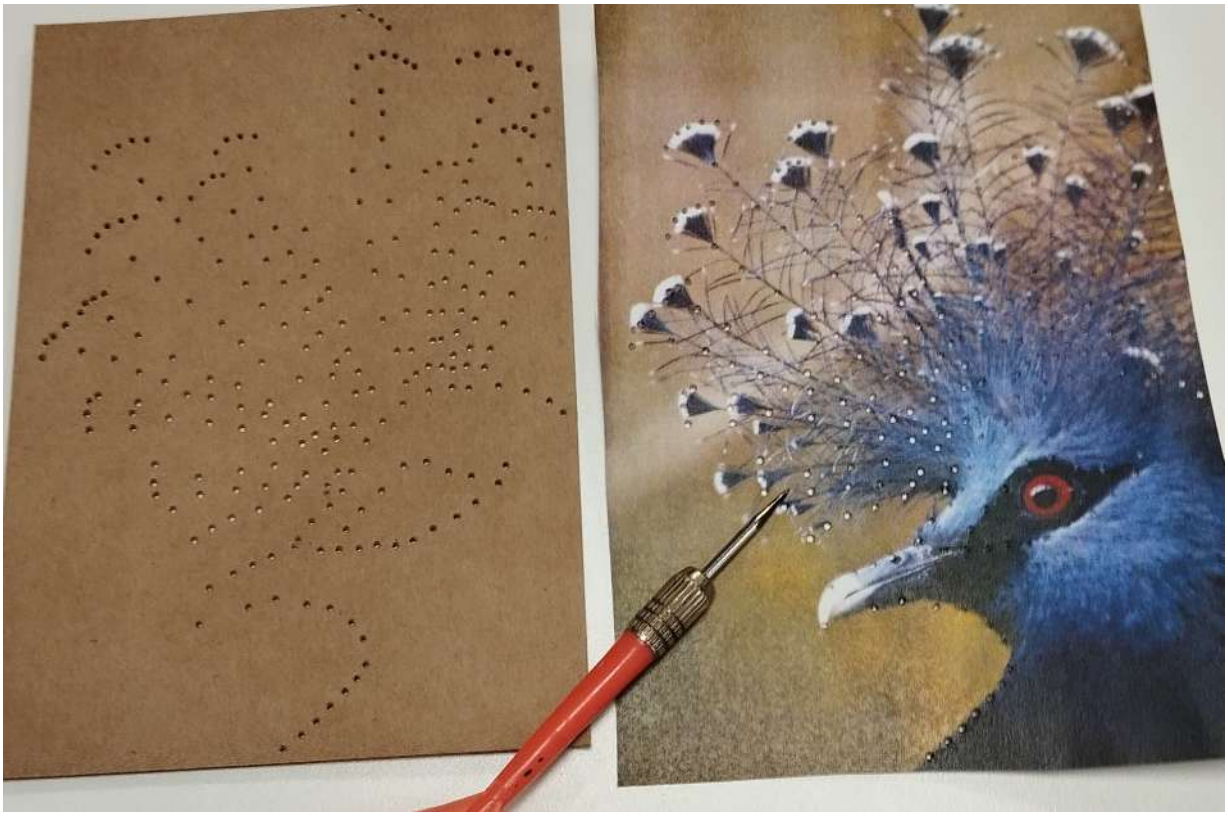
Materials needed:

- Sturdy cardboard
- A picture of a crowned-pigeon, the size of the embroidery you want to make
- A base for punching (e.g., styrofoam, cork)
- Awl
- Embroidery needle
- Embroidery thread
- Scissors

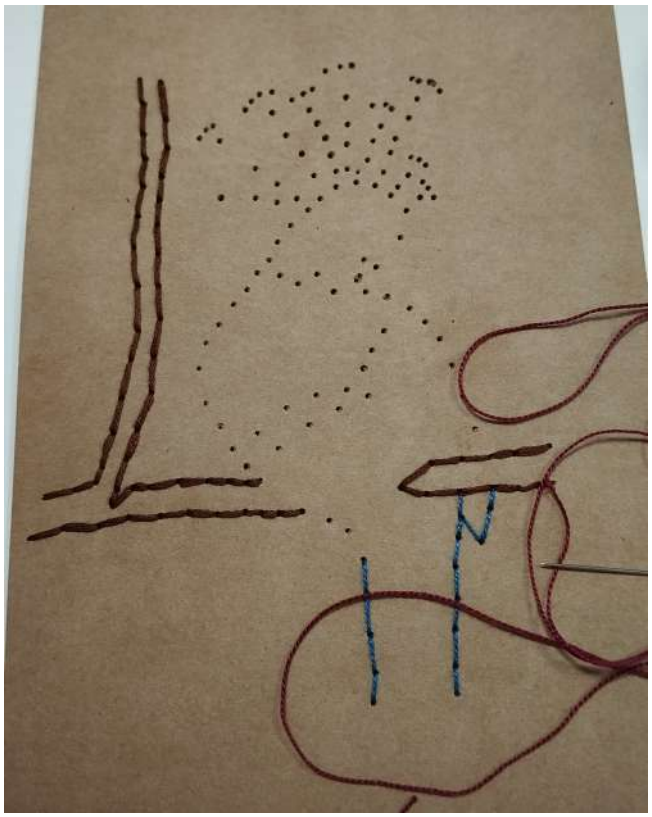
Let's get started!

1. Take a sheet, print or draw the desired pattern on it.
2. Mark dots at equal distances along the pattern line.
3. Slide a base under the sheet along with the cardboard.
4. Punch through the marked dots with an awl so that the pattern appears on the cardboard (see below).
5. Start embroidering on the cardboard: secure the embroidery thread on the back, then proceed through the holes, embroidering the pattern.
6. You can do this in several ways: you can pass the thread through a hole multiple times as a hub, or just once. It's up to you how you want to guide the thread from one hole to another. The threads can run next to or over each other. The intersections of the threads will outline the desired patterns and shapes (see below).
7. Embroider neatly and tightly, but don't pull the thread too hard.
8. When the embroidery is finished, secure the thread on the back.
9. You can glue a backing to the finished work with another piece of cardboard or attach it to the front of a notebook (see below).

4.



6.



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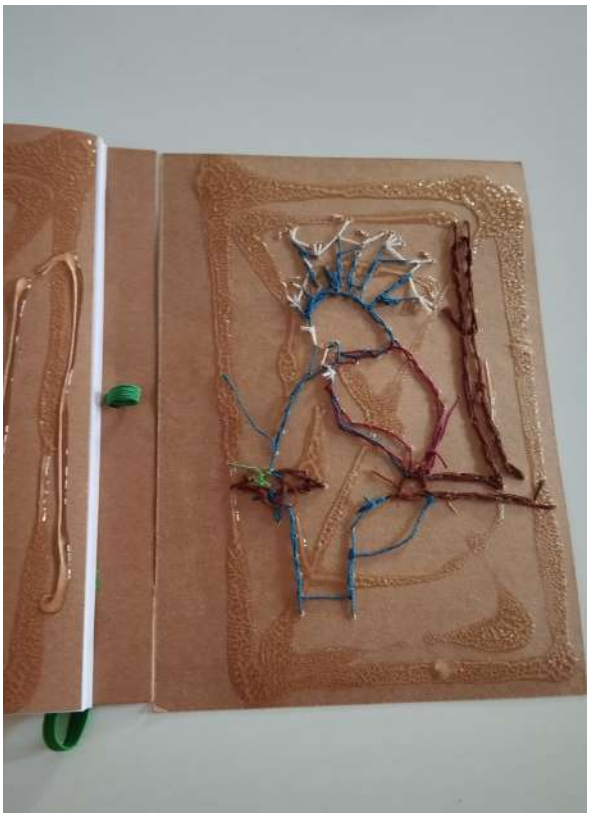

Make a grass head!

As spring approaches, we increasingly long for fresh green plants in our homes. Let's bring nature closer, plant seeds, and make a grass head for home decoration!

Necessary materials and tools:

- Used stockings (thinner than 40 denier)
- Small seeds that even a crowned-pigeon would eat, e.g. grass seed, wheat, sorghum, millet
- Potting soil
- Bowl/container
- String
- Scissors

Let's get started!

1. Mix 3 tablespoons of seeds with 3 handfuls of soil.
2. Find a part of the stocking that is not torn, it is intact. Cut out a piece as big as you want the grass head to be!
3. Fill the seed-mixed soil into the stocking and tie its mouth so the soil does not fall out.
4. Place it in a glass bowl, spray it with water daily, and wait until the whole ball turns green!

List of photographs and illustrations - crowned-pigeon themed handcraft ideas

Make a crowned-pigeon stamp!

1-4. Photo by Boglárka Takács-Kocsis

Making a crowned-pigeon figure

5-14. Photo by Borbála Kocsis

Make a seed ball from recycled paper!

15-16. Photo by Boglárka Takács-Kocsis

Bird ringing bracelet

17. Photo by Emese Czeczidlowszky-Hervatin

Paper thread art

18. Photo by Borbála Kocsis

19-22. Photo by Ildikó Hraskó

Make a grass head!

23-25. Photo by Boglárka Takács-Kocsis

26. Sclater's crowned-pigeon *(Goura sclaterii)* by Marcin Konsek, Wikimedia commons

Crowned-pigeon inspired gastro ideas

SUMMARY TABLE

However, everyone's abilities and skills are different, we recommend an assistant of an adult for the activities highlighted in blue. Please, always be cautious when using sharp objects.

Crowned-pigeon inspired gastro ideas	Age group (years old)				
	3-6	6-10	10-14	14-18	18+
Satay chicken			x	x	x
Blue cocktails					x
Blue non-alcoholic cocktails	x	x	x	x	x
Crowned-pigeon cake			x	x	x
Fruit salad		x	x	x	x

Satay chicken

If you want to feel the atmosphere of the land of the beautiful crowned-pigeons the best way is to try the flavours of the home of these birds.

One of the most popular dishes, satay chicken, is a perfect choice for this. The rich, creamy peanut sauce crowns your meal.

Although both Thailand and Malaysia would like to claim it as their own, the origins of this dish can be traced back to Java, Indonesia. While crowned-pigeons live on another island, New Guinea, this dish is popular in that area, too.

Although there are many versions to make it, we aim to bring you an easy-to-make recipe instead of sticking to the truly authentic version. You can serve it with rice and steamed vegetables of your taste.

Notes

You can also make the recipe from beef or pork, and if you opt for a vegetarian version, you can substitute the chicken with tofu too. Make sure you press out the water before you use it. If you prefer a vegan version, replace the butter with vegetable, e.g. peanut oil.

One of the staple ingredients is ketjap manis, a sweet, thick, dark soy sauce you can buy in most Asian stores. If it is not available, you can make a substitute. You can find more info on this after the recipe.

Ingredients

For the chicken

- 1 lb / 500g chicken breast or thigh fillets (skinless and boneless)
- 2 1/2 tbsp ketjap manis
- 1 tbsp unsalted butter, melted
- 12 – 14 small bamboo skewers, soaked in water for at least 30 minutes

Peanut sauce

- 1 tbsp cooking oil (peanut, canola, vegetable)
- 2 garlic cloves, crushed
- 1 small red onion or shallots, chopped
- 1-3 fresh birds eye chillis, depending on how hot you like your sauce, chopped
- 1/2 cup / 125g / 4.4 oz peanut butter
- 1 cup full fat coconut milk
- 2 1/2 tbsp ketjap manis
- 1/2 tbsp soy sauce
- 1/2 tsp salt
- 2 tbsp fresh lime juice

Garnish

- Crushed peanuts
- Lime wedges
- Sliced shallots/scallions

Instructions

Chicken

1. Cut the chicken into 1.5cm/0.5” cubes.
2. Mix the ketjap manis and the melted butter and fold the chicken cubes into it.
3. Thread 4-6 pieces of marinated chicken cubes onto skewers.
4. You can cook the skewers on a BBQ/grill, but it works perfectly in a large non-stick fry pan with some oil. Just make sure the skewers fit in the pan.
5. You can serve it with the rice and vegetables and the peanut sauce. Garnish it with chopped peanuts, shallots, and lime wedges.

Peanut sauce

1. Heat oil in a small saucepan over medium-high heat.
2. Add the onions, garlic and chilli and cook them for 3 minutes, till the onion is translucent. Be careful not to burn it, stirring it often.
3. Turn the heat down to medium, then add peanut butter, coconut milk, ketjap manis, soy sauce and salt.
4. Simmer for 10 minutes, whisking occasionally. Don't worry if the oil separates from the rest.
5. Use a stick blender to puree the sauce. If you make this in a blender, let it cool a bit.
6. Add the lime juice and simmer for another 2 minutes.
7. Let it cool a bit before you serve it. It will thicken, which is normal.

What can you do if you don't have Ketjap manis?

You can use dark soy sauce and sugar. For every 3 tablespoons of dark soy sauce, use 1 tablespoon of sugar.

If you have regular, light soy sauce, you will need more sugar as it is thinner than dark soy sauce. In this case, the ratio is 1:1. If you don't want to make a syrup-like substitute, just add half a tablespoon of soy sauce and half a tablespoon of coconut, palm or brown sugar for every tablespoon of ketjap manis, what the recipe calls for. You can use tamari and sugar in a 1:1 ratio if you need a gluten-free version.

If you have more time, mix 1 cup of light soy sauce with 1 cup of brown sugar in a saucepan and, in low heat, simmer while stirring. After 5-10 min you can see a more syrup-like consistency. Let it cool, store it in the refrigerator in an airtight container, and use it later. What we don't recommend is to use fish sauce or Worcestershire sauce. These are too thin or have different tastes.

All in all, while these options mentioned above are not the perfect substitutes, don't be discouraged, just enjoy cooking and experimenting with different flavours.

Crowned-pigeon inspired cocktails

Disclaimer:

This content is intended solely for audiences of legal drinking age, and is not intended to promote alcohol consumption, overconsumption or abuse. Creating alcoholic or non-alcoholic blue cocktails is an idea of a fun activity to engage responsible adults and raise awareness of threatened blue pigeon species, such as the blue crowned-pigeon. We remind anyone of legal drinking age who wishes to try the recipes to do so responsibly and only if their health and physical condition allow it. EAZA shall not be liable for any consequences of the consumption of these cocktails.

Tips:

When decorating cocktails, you can let your imagination run wild. You can use citrus peels cut into different shapes, citrus slices and wedges, edible flowers, maraschino cherries, mint and other herb leaves, fruits, and everything edible. You can make your blue cocktail more crowned-pigeon-like if you use maraschino cherries, which resemble the birds' red eyes, and some fresh herbs, such as basil or mint, to make them more tropical.

If you want, you can add some drops of liquid blue food colour to some decorating sugar to make them blue. Be careful not to clump the sugar and let it dry before using it.

The portion sizes are just estimations; it will always depend on the size of your glasses and how much ice you add in the case of blended cocktails. The best thing about cocktails is that you can always make them based on your taste. Do you prefer longer drinks? Add more lemonade or juice. Do you like it more slushie style? Add more ice to the blender.

If you make an ice-blended cocktail, ensure your blender is suitable for blending ice.

Some recipes call for lemonade; you can use store-bought, but we always prefer the homemade version. You can find a simple syrup and a home-made lemonade recipe after the mocktails.

ALCOHOLIC COCKTAIL

Blue alcoholic drinks

Blue gin tonic

2 servings

Ingredients

- 60 ml/ 2 fl. oz. gin
- 1 tbsp lime juice
- 120 ml/ 4 fl. oz. Tonic water
- 30 ml/ 1 fl. oz. Blue Curaçao

Preparation

1. Combine all ingredients with ice in a shaker and stir it.
2. Strain the drinks into ice-filled glasses.
3. Decorate them.

ALCOHOLIC COCKTAIL

Blue Hawaiian Cooler

3 servings

Ingredients

- 120 ml/ 4 fl. oz. light rum
- 120 ml/ 4 fl. oz. Blue Curaçao
- 60 ml/ 2 fl. oz. coconut rum
- 60 ml/ 2 fl. oz. cream or coconut cream
- 60 ml/ 2 fl. oz. pineapple juice
- Handful of ice

Preparation

1. Combine all ingredients with ice in a blender and blend until smooth.
2. Serve it in glasses and decorate them.

ALCOHOLIC COCKTAIL

Frozen Blue Moscato Margaritas

4 servings

Ingredients

- 2-3 handfuls of ice
- 240 ml/ 8 fl. oz. Moscato or any sweet wine
- 240 ml/ 8 fl. oz. Blue Curaçao
- 120 ml/ 4 fl. oz. tequila
- 2 tbsp. lime juice
- 1 tbsp. granulated sugar for rimming
- 1 tbsp. salt for rimming
- Lime wedges for rimming

Preparation

1. On a small plate, mix the sugar and the salt. Rim your glasses with a lime wedge, then dip them in the sugar-salt mixture.
2. Pour the Moscato, Curaçao, tequila and lime juice in a blender. Add the ice and blend until smooth. (If the mixture is too loose, add more ice until you have the preferred consistency.)
3. Divide the mixture between the glasses; be careful with the decorated rim. Garnish them as you prefer.

ALCOHOLIC COCKTAIL

Tiffany Mimosas

Yields: 10 servings

Ingredients

- 2 tbsp granulated sugar for rimming
- 1 lemon wedge for rimming
- 60 ml/ 2 fl. oz. Blue Curaçao, divided (a splash per glass)
- 1 bottle of cold Champagne or Prosecco
- 480 ml/ 16 fl. oz. cold lemonade, divided
- Ice if you prefer your drinks ice-cold

Preparation

1. Put the sugar in a small plate. Rim your glasses with a lime wedge, then dip them in the sugar.
2. Add a splash of Blue Curaçao to each glass.
3. Fill halfway with the prosecco or champagne, then top with lemonade.
4. If you prefer ice-cold drinks, you can add ice cubes too.

ALCOHOLIC COCKTAIL

Tropical Mermaid Lemonade

Yields: 3 servings

Ingredients

- 3 tablespoons of raspberry syrup
- 60 ml/ 2 fl.oz. Blue Curaçao
- 180 ml/ 6 fl.oz. white rum
- 360 ml/ 12 fl.oz. lemonade
- Ice

Preparation

1. Add 1-1 tablespoon of raspberry syrup to each glasses.
2. Add 1-2 ice cubes and divide the Blue Curaçao between the glasses.
3. Divide the white rum too and pour into the glasses carefully to keep the layers.
4. Fill the glasses carefully with ice and slowly top them with lemonade.
5. Decorate the glasses as your wish.

Blue mocktails (non-alcoholic cocktails)

Tips:

If you want to make beautiful blue-coloured non-alcoholic drinks, you have several options. Remember that natural options might not give you such vibrant blue colours as artificial blue colourants.

Blue Curaçao syrup:

The easiest way to swap the alcoholic version of the classic Blue Curaçao is to use the syrup version. It is commercially available in most of the countries. This is the best way to achieve the same colour and flavour in non-alcoholic mocktails but without the alcohol content.

Blue food colouring:

You can use liquid blue food colouring if you don't want the taste of Blue Curaçao. Remember, every brand is different, it is wise to start with small amounts and add more till you reach the desired colour. Be aware that some food colourants are acid-sensitive; the colours can change when you add lemon or other acidic fruits.

Blue ice cubes:

An upgraded version of using blue food colour if you make blue water and freeze it. The cubes will add a blue shade to your drink as the ice melts.
Blue butterfly pea flower tea:
Try blue butterfly pea flower tea if you prefer to use something less synthetic. Did you know it is also called Asian pigeonwings? What better choice you can have.
The flowers of the Clitoria ternatea plant are used to make blue tea, which changes to purple as the pH level changes to more acidic. You can experiment with adding lemon or other citrus fruits.

Blueberry juice:

Another option is the use of blueberry juice. It won't give you a vibrant blue shade, but if you love the taste and the purplish hue is good for you, give it a try!

NON-ALCOHOLIC COCKTAILS

Blue lagoon mocktail

Yields: 3 servings

Ingredients

- Ice cubes
- 30 ml/ 1 fl. oz. freshly squeezed lemon juice
- 50 ml/ 1.7 lf. oz grapefruit juice
- 30 ml/ 1 fl. oz. Blue Curaçao syrup
- 100 ml/ 3.4 fl. oz. home-made lemonade

Preparation

1. Put ice into 3 glasses.
2. Pour the Curaçao syrup, the lemonade and the grapefruit juice in a cocktail shaker and stir it gently.
3. Divide it between the glasses.
4. Decorate the glasses as you prefer.

NON-ALCOHOLIC COCKTAILS

Virgin Blue Margarita Mocktail

Yields: 1 servings

Ingredients

- 15 ml/ 0.5 fl. oz. Blue Curaçao syrup
- 15 ml/ 0.5 fl. oz. freshly squeezed lime juice
- 60 ml/ 2 fl. oz. home-made lemonade
- 1 tbsp salt for rimming
- 1 tbsp sugar for rimming
- Lemon wedges for rimming
- Ice

Preparation

1. Mix the salt and sugar on a small plate. Rim your glasses with a lemon wedge, and then dip them in the mix.
2. Add a handful of ice and all the ingredients in a cocktail shaker.
3. Shake it till it is cold.
4. Strain it and pour it into the rimmed glasses.
5. Decorate more if you'd like to.

NON-ALCOHOLIC COCKTAILS

Virgin Blue Piña Colada

Yields: 3 servings

Ingredients

- 200 g/ 7 oz. frozen pineapple
- 150 ml/ 5 fl. oz. coconut cream
- 45 ml/ 1.5 fl. oz. Blue Curaçao syrup
- 250 ml/ 8.5 fl. oz. pineapple juice

Preparation

1. Add all the ingredients into a blender and blend it till smooth.
2. Serve it in glasses and decorate them.

NON-ALCOHOLIC COCKTAILS

Blue Mermaid Tonic Mocktail

Yields: 1 servings

Ingredients

- 1 tablespoon of raspberry syrup
- 1 tablespoon of Blue Curaçao syrup
- 80 ml/ 3 fl. oz. lemonade
- 80 ml/ 3 fl. oz. tonic water
- ice

Preparation

1. Add 1 tablespoon of raspberry syrup to your glass.
2. Add 1-2 ice cubes and add the Blue Curaçao syrup too.
3. Pour the lemonade too, carefully, to keep the layers.
4. Add more ice till the rim and slowly top your drink with tonic water.
5. Decorate the glasses as you prefer.

Extra recipes for the cocktails:

Home-made lemonade

Ingredients

- 2 lemons
- The zest of 1 lemon
- 500 ml/ 17 fl. oz. water
- 4 tablespoons of simple syrup (or depending on how sweet you like your lemonade)

Preparation

1. Squeeze the lemon juice and add the zest.
2. Add 500 ml/ 17 fl. oz. water
3. Add the simple syrup and stir it well.
4. If you don't like pulp and zest, you can strain the lemonade before you add them to your cocktails.

Simple syrup

Ingredients

- 200 g/ 7 oz. sugar
- 200 ml/ 7 fl. oz. water

Preparation

1. Combine the sugar and water in a small saucepan.
2. Heat the mixture up, making sure it won't caramelise.
3. Let it cool, and pour it into a jar. Add some to your lemonade or cocktails till it is sweet enough for your taste.

Crowned-pigeon cake

For the crowned-pigeon cake, it is enough to add blue food colouring to the cream of your favourite cake recipe, which uses white cream. The almond-shaped spots around the eyes and the beak are made of black fondant, and the eyes can be any red berry, lyophilized cherry, or a bigger candy if it is red.

For the bird's crown, cut out 2 quarter circles from thick blue cardboard, cut the curved edge into a wavy shape, and then draw the feathers on both sides of the paper.

Pin the crowns to the centre of the cake only before serving.

In our experience, the cake looks better if it is made of smaller layers and is taller than if it is based on larger diameter layers and is a flatter cake.

We successfully tried the crowned-pigeonon cake with the following 3-layer cocoa sponge cake recipe filled with American buttercream and jam. You can find more tips for making it after the recipe.

Ingredients for 3 cake tins with a diameter of 17 cm (about 6.7 in)

Cake

- 9 eggs, separated
- 195 g/ 7 oz. sugar
- 1.5 tbsp vanilla extract
- 75 g/ 2.6 oz. melted butter
- 75 g/ 2.6 oz. unsweetened cocoa powder
- 15 g/ 0.5 oz. baking powder
- 150 g/ 5.3 oz. plain flour
- Pinch of salt and a bit of lemon juice for the egg whites

American buttercream

- 340 g/12 oz. butter, room temperature
- 630 g/ 22 oz. Powdered sugar, sifted
- 3 tsp. Vanilla extract
- 3 tbsp. cream
- 1/3 tsp. salt
- Blue food colouring (we used powdered)
- Berry jam, we used raspberry (do not mix this into the cream)

Decoration

- Black fondant for the eye spots and for the beak
- Toothpicks to attach the beak
- Dark blue cardstock paper for the crown
- Black marker

Preparation

Cake layers

1. It is best to bake the sponge cake layers individually. Use a third of the specified amount for each layer, preferably making the batter separately so the egg whites won't collapse.
2. Preheat the oven to 175 degrees Celsius (fan)
3. Beat the egg yolks with the sugar and vanilla extract until almost white, then add the melted butter too.
4. Mix the flour, cocoa powder and baking powder in a separate bowl.
5. In a third bowl, whisk the egg whites with a pinch of salt and a little bit of lemon juice until they form stiff peaks.
6. Gently combine the two egg foams, then bit by bit, fold the flour-cocoa-baking powder mix into the batter, creating a smooth texture.
7. Pour the mixture into a cake tin lined with baking paper. Try to create a little bit of a crater shape; this will help the cake to rise more evenly.
8. Put it in the oven for 25 min or until a needle comes out clean.

American buttercream

1. Cream the butter with a hand mixer until it is almost white.
2. Add the sifted powdered sugar one spoon at a time, scraping down the edge of your bowl, ensuring each sugar portion is fully incorporated.
3. Add the vanilla extract, salt, and cream and mix well.
4. Add the food colouring till you reach the desired depth. You can experiment deepening the colour with a tip down below.

Assembling the cake

1. Take a portion of the cream at room temperature in a separate bowl. It is used for crumb-coating the cake, so having a smaller portion and adding more later is better.
2. Apply a little cream to the cake tray to attach the first layer, preventing the cake from sliding. Put a layer of cream on it, forming a small rim, then put a couple of tablespoons of jam on it. The rim prevents the jam from spilling out.
3. Place the middle cake layer on top, then repeat the cream-jam step.

4. Place the third layer on top, then cover the cake thinly with the remaining cream. This layer doesn't have to be nice and thick; it just serves the purpose of letting the crumbs stick to it.
5. Put the cake into the fridge for 20 minutes.
6. Cover the cake evenly with the leftover cream.
7. Form the beak from the fondant and attach it to the cake with a toothpick.
8. Cut two almond-shaped eye patches from a 3-5 mm thick black fondant, then place them on the cake. Attach the red eyes to the fondant with a tiny amount of cream.
9. Just before serving, insert the bird's crown into the centre of the cake.

Tips

- Once they are cooled down, the cake layers should be placed in an airtight container or wrapped in beeswax cloths, and stored in the refrigerator until the cake is assembled.
- It may seem like a bold idea, but if you want the colour of the food colouring to be brighter, you should put the buttercream in the microwave for 20-30 seconds. It should be partially melted but not liquid. This will liquefy the cream a little, but if you put it back in the fridge and let it cool back a bit, you can beat it up again. The cream will have a beautiful, deep colour. Don't be alarmed if the cream initially seems to curdle; after thoroughly mixing, it comes together nicely and is ready for use at room temperature.
- The cream can be prepared in advance and stored in an airtight container in the refrigerator for a week.
- Be careful with blue food colouring and coloured cream, it tends to stain everything you touch.

Simple fruit salad

Fruit is the main part of crowned-pigeons' diet. Do you want to get a taste of what these magnificent birds eat? Try the fruit salad recipe below!

Ingredients

Look around your home for some good seasonal fruits.
For example, cantaloupes, pears, blueberries, cherries, and sour cherries are good choices: they're tasty, not too soft, and won't fall apart. But if you have pineapple, papaya or oranges at home, that's great too!

Instructions

1. Wash everything thoroughly under running water but be careful not to use too much water!
2. Cut the fruit into smaller pieces if necessary, such as cantaloupes and pears. Cut the cherries in half and remove the pits. (If you're adding grapes, you can do the same - if they're seedless, just cut them in half). Small berries can go in whole. Be careful, if the knife is too sharp, ask an adult for help!
3. When you're done, check the fridge again to see if there's any fruit left to put in the fruit salad. Try to avoid food waste!
4. Gently mix the prepared fruit in a suitable container. Be careful not to break them! And there you have it, a fruit mix that crowned-pigeons would love to eat too!
5. If it is a summer day, and the weather is hot, it's good to have plenty of liquid, so you can make your salad even more delicious. Just add chilled fruit tea or black tea that you've prepared beforehand. (You can add store-bought fruit juice if you like, but think about the environmental impact of the cartons!)
6. Once chilled, it's ready to eat – enjoy!

+1. Don't throw away the shells, peels, seeds, and other leftovers! If you can, compost them or give them to an animal that will enjoy them.

List of photographs and illustrations - crowned-pigeon inspired gastro ideas

Satay chicken

1-2. Photo by Borbála Kocsis

Blue alcoholic drinks

3-7. Photo by Borbála Kocsis

Blue mocktails (non-alcoholic cocktails)

8-11. Photo by Borbála Kocsis

Crowned-pigeon cake

12. Photo by Borbála Kocsis

Simple fruit salad

13-21. Photo by István Mező

22. Sclater's crowned-pigeon *(Goura sclaterii)* by Manh Hung Ngo, Unsplash