INFECTED & UNDETECTED

Zoonoses and Exotic Pets in the EU

AAP

AAP Animal Advocacy and Protection is dedicated to a better future for exotic animals in Europe, such as monkeys, lions and serval cats. Currently, millions of exotic mammals are illegally trafficked, kept as pets or used in circuses and other forms of entertainment. This causes an unimaginable amount of animal suffering. Our goal is to end this suffering, by saving animals in need and by ensuring that the suffering of millions others is prevented.

In our specialised shelters in The Netherlands and Spain, we rescue and rehabilitate animals in need. Once they have recovered, we find these animals suitable forever homes. But rescue alone is not enough. Based on almost 50 years of rescue expertise, we campaign for better animal welfare legislation for exotic animals across Europe. Because only by tackling the causes, can future animal suffering be sustainably prevented!

Citation

AAP (June 2021) 'Infected and Undetected: Zoonoses and Exotic Pets in the EU', available at: www.aap.nl/publications

Authors:
Marieke Vreeken
Alejandra San Quirico
Paul van der Wielen
Contributors & Editors:
Heleen Post-Van Engeldorp Gastelaars
Hester van Bolhuis
Thomas Redelijk
Marta Merchan
Ilaria Di Silvestre
Eva Schippers
Design: Alejandra San Quirico & Warner van Haaren
Infographics: Daniel Sánchez Martínez & Aarón Sánchez Pérez
Photography: AAP / Hedske Vochteloo
Cover: Northern Raccoon *(Procyon lotor)*

Contents

Ring-tailed Lemur *(Lemur catta)*

Introduction

Eight baboons kept in the basement of a private home in Germany. Cages filled with bats, stacked between reptiles and silver foxes, at an animal fair in the Netherlands. Exotic squirrels, sold on a French website to the highest bidder. These are just some examples of the myriad of ways in which the exotic pet trade manifests itself within the European Union (EU). It is an industry that often goes unnoticed, that operates in a regulatory space with limited controls and oversight, and which exact scale remains elusive. Yet, the operations of this specific trade have far-reaching and pervasive ramifications that can affect, and should concern, us all.

EU citizens tend to be surprised when they discover that it is perfectly legal in many EU Member States to trade and keep the vast majority of the world's wild animal species as pets.[1] But in fact, the EU is one of the largest markets in the world for exotic pets and, as such, a major driver for the trade in live wild animals.[2] The legal trade of wild animals into the EU alone is worth 100 billion euros annually.[3] Over 500 million individual animals are estimated to be kept as pets within the EU, including mammals, reptiles, birds and fish.[4] A large variety of species are found in this trade.[5] AAP[6] alone has rescued around 200 different mammal subspecies in the past ten years. Internationally, the legal wildlife trade has increased 500% in value since 2005 and 2000% since the 1980s.[7]

The EU is one of the largest markets in the world for exotic pets.

While the exotic pet trade in the EU is booming, it is certainly not without risks. Exotic pets have highly complex physiological and ethological needs, making it very difficult, if not impossible, for the average household to provide the proper nutrition, housing and care to meet those needs. As a result, exotic pets can suffer from serious health and welfare impairments or even die prematurely.[8] Furthermore, animals are often harvested from the wild to supply the exotic pet trade, which contributes to the decline of wild populations and can threaten species' conservation.[9] Biodiversity within the EU is also jeopardized by the exotic pet trade, as exotic pets can become invasive alien species when they escape or are released into the environment.[10] Finally, the exotic pet trade poses risks to public health and safety. Exotic pets are still wild animals and as such they are often capable of inflicting serious injuries and of transmitting zoonoses.

Zoonosis[11]

Infections acquired directly or indirectly from animal reservoirs that cause clinical disease in humans

Emerging Infectious Diseases

Evolution of micro-organisms from nature resulting in human-to-human infections which are independent of animals

Zooanthroponosis (Reverse Zoonosis)

Infections transmitted from humans to animals

In this article, we will zoom in on this latter aspect; the zoonotic disease risks associated with the exotic pet trade. The next section will offer a short overview of the role that wild animals are known to play in the transmission of zoonotic diseases. Section 3 will provide the results of our analysis of zoonotic pathogen detection in exotic mammal pets that were rescued by AAP from various EU Member States between 2016 and 2020. Section 4 will discuss the gaps in the existing EU regulatory framework to address the zoonotic disease risks stemming from the exotic pet trade, followed by our conclusions and recommendations.

Wild animals and zoonotic diseases

As the COVID-19 pandemic has so poignantly illustrated, the transmission of zoonotic diseases can have a devastating impact on our health, economy and society at large. SARS-CoV-2 may be the most recent example of a zoonotic virus that has highly likely originated in wildlife, but it is not the first and will probably not be the last. Globally, zoonotic disease outbreaks have been on the rise since the 1980s[12] and numerous zoonotic virus outbreaks have preceded SARS-CoV-2, including other SARS coronaviruses, MERS coronaviruses, Ebolavirus and monkeypox virus to name a few.[13] In fact, scientists estimate that 75% of emerging infectious diseases are zoonotic in nature and that the majority of them originate in wild animals.[14]

The trade in wild animals, including the exotic pet trade, is a well-known risk factor in zoonotic disease transmission.[15] Zoonotic risks are widely acknowledged and referenced in literature on illegal wildlife trade. But these risks are also prevalent, yet often ignored, when it comes to the *legal* trade in wild animals, including exotic pets, even though this trade is several orders of magnitude larger than illegal wildlife trade.[16] Wildlife trade provides disease transmission mechanisms at a scale that can not only cause human disease outbreaks, but also threatens livestock, international trade, rural livelihoods, native wildlife populations and the health of ecosystems.[17] Worldwide, disease outbreaks resulting from wildlife trade have caused hundreds of billions of dollars of economic damage.[18]

Wild animals are a reservoir for both known and unknown pathogens, yet the exotic pet trade brings an ever-increasing variety of wild animal species into close contact with humans and other animals that they have not interacted with before, thereby increasing zoonotic spill-over risks. Many zoonotic pathogens carried by wild animals are not host-specific and can be transferred to not only humans, but also to domesticated animals, livestock and endemic fauna. Spill-over risks are therefore particularly prevalent where the pet trade interfaces with natural environments and agricultural food systems. Research found over 70 different zoonotic pathogens that are linked to exotic pets.[19] The majority of all known zoonotic pathogens have had mammal spe-

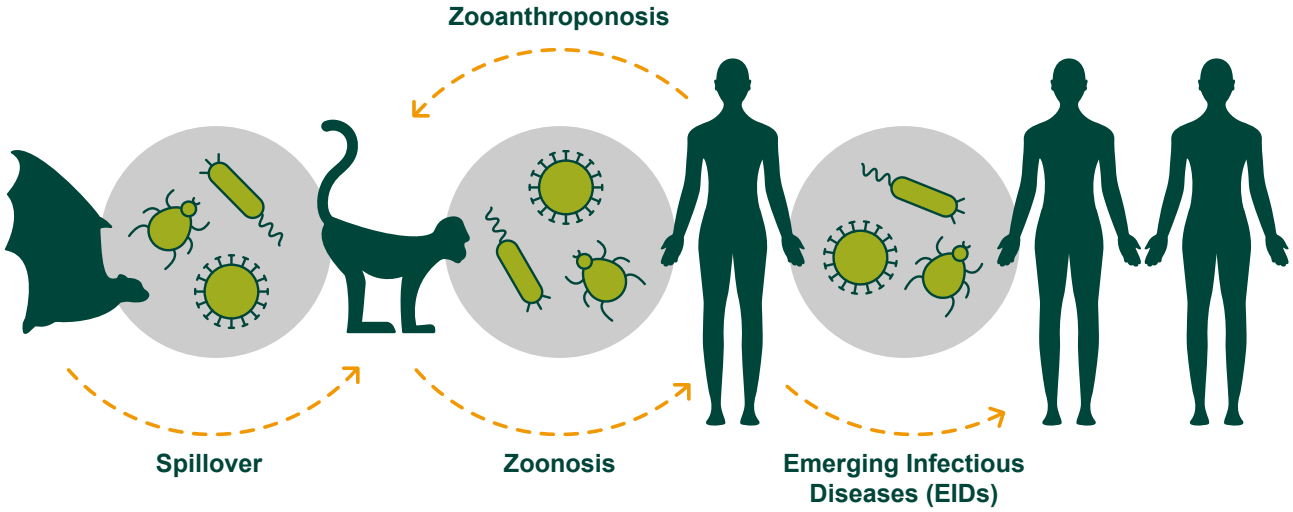


Figure 1: ***Pathway diagram of potential pathogen transmission.***

cies – particularly non-human primates, carnivores, ungulates, bats and rodents – as a host[20], many of which are still legally traded and kept as pets in EU Member States. A previous AAP study revealed that, between 2015 and 2019, AAP rescued exotic mammals that were susceptible to more than 120 different zoonotic viruses, bacteria and parasites that could be dangerous or potentially lethal to humans.[21]

The increasing human exploitation of wild animals places us in ever-closer proximity to a wide variety of wild animals and greatly enhances our risks for encountering new pathogens.

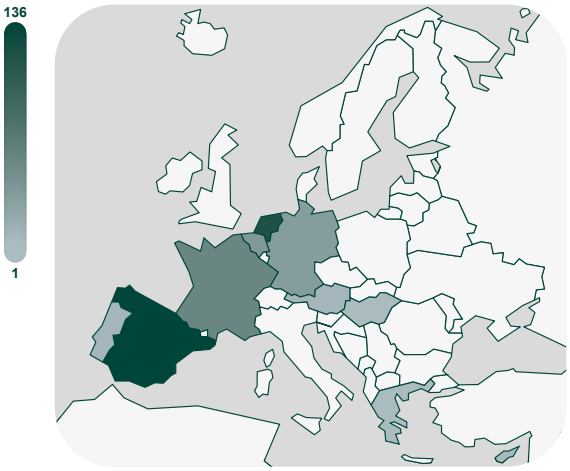
A compounding problem is the fact that we simply do not know which unknown pathogens might still be hiding within which animal species. There is no comprehensive overview of the zoonotic potential of animal species and a structural health surveillance system does not exist for wildlife and exotic pets like it does for livestock and domesticated pets. This is a major gap in the surveillance of emerging zoonoses.[22] As a result, zoonotic pathogen detection in wild animal species remains extremely limited, with many pathogens yet to be detected.[23] An estimated 1.7 million currently undiscovered viruses are thought to exist in mammal and avian hosts. Of these, 631 000 – 827 000 could have the ability to infect humans.[24] Furthermore, the conditions in which wild animals are kept and transported along the trade chain – which tend to be unsanitary, overcrowded with conspecifics or other species, and highly stressful for the animals – can lead to serious health deteriorations and exacerbate zoonotic disease risks.[25] Such conditions can trigger the emergence and spread of zoonotic pathogens in traded wild animals, even of pathogens that are not commonly found in their conspecifics in the wild.


Barbary Macaque *(Macaca sylvanus)*

The fact that the majority of emerging zoonotic diseases originate in wildlife does not mean that wild animals themselves are to be blamed for the role they play in disease transmission. Zoonoses have always existed in wildlife, but it is the increasing human exploitation of wild animals (which takes many forms, from the exotic pet trade to bushmeat consumption and the destruction of natural habitats) that places us in ever-closer proximity to a wide variety of wild animals and greatly enhances our risks for encountering new pathogens. It is these human behaviours that need to be addressed in policy responses if we are to truly decrease the risks of zoonotic disease outbreaks. Encouragingly, politicians, scientific institutions and stakeholders are increasingly calling for a better regulation of the trade and keeping of wild animals to properly address these root causes of zoonotic disease outbreaks.[26]

Infected exotic mammal pets rescued by AAP

Exotic pets have a relatively high probability of being infected with a zoonotic pathogen, especially when they are captured directly from the wild.[27] These pathogens can be contracted by humans or other animals during close contact with the exotic pet, such as through inhalation, non-traumatic contact (i.e. direct or indirect contact with animal skin, hair, blood, carcass or excreta) and traumatic contact (i.e. animal bites or scratches).[28]



Map 1: ***Countries of origin of rescued animals.***

Of the 340 rescued animals included in the analysis, that came from private households or found astray, 136 originated from Spain and 131 animals were rescued in the Netherlands. Animals were also rescued from France, Belgium, Germany, Austria, Portugal, Cyprus, Greece and Hungary.

There have been some reported instances of zoonotic disease transmission caused by the exotic pet trade in the EU. In 2015 for example, Variegated Squirrel Bornavirus 1 (VSBV-1) was detected as the cause of acute fatal encephalitis among three breeders of exotic squirrels in Germany.[29] However, as there is no structural health monitoring and zoonotic pathogen testing for all the exotic pets kept and traded in the EU, there are very likely many more zoonotic spill-over risks looming that we are unaware of.

AAP has analysed the prevalence of zoonoses in exotic mammal pets that were rescued from EU Member States. The focus is exclusively on mammal species, as these are the species that AAP rescues and has expertise on. Our analysis covered 340 exotic mammals rescued by AAP between 2016 and 2020 that either came from private owners or were found astray within 10 EU Member States.[30] Stray animals were included in the analysis due to a high likelihood that these animals were formerly kept as pets and were either released or escaped. Between 2016 and 2020, AAP has rescued 276 exotic pets, of which 32 animals had at least two consecutive private owners. 262 of these animals came directly from their private owners, or were shortly emergency-housed before transfer, and were included in the analysis.[31] Between 2016 and 2020, AAP also rescued 88 stray animals, of which 23 animals had both a stray and private ownership background. 78 of these animals came directly from astray, or were shortly emergency-housed before transfer, and were included in the analysis.

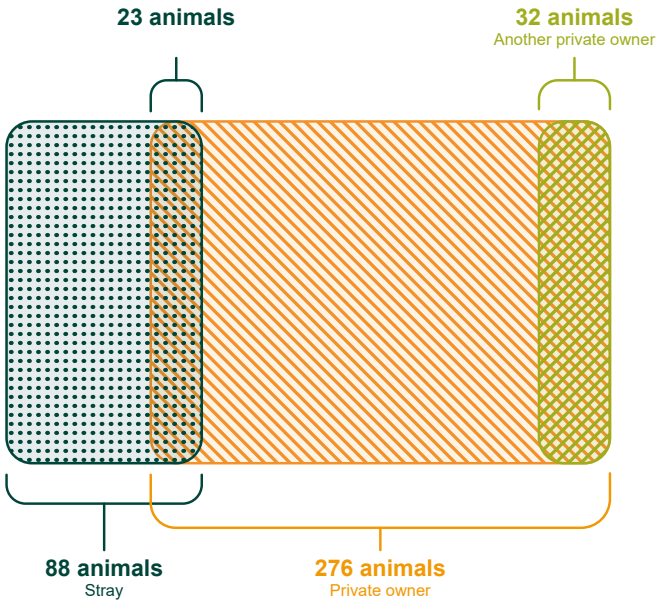


Figure 2: ***Number of animals rescued by AAP with a private ownership background and/or stray background (2016-2020).***

Table 1: ***Overview of pathogens checked and detected (in bold) during quarantine in AAP's rescue centers.***

A) Pathogens tested for	B) Pathogens tested based on suspected origin / symptoms
Bacteria	
Mycobacterium bovis, tuberculosis	*Leptospira* spp. (all carnivores are vaccinated)
Mycobacterium avium	*Francisella tularensis*
***Campylobacter* spp**	*Brucella* spp.
Clostridium difficile	
***Salmonella* spp**	
Shigella spp	
Yersinia pseudotuberculosis	
Viruses	
STLV (Simian-T-lymphotropic virus) / HTLV	Monkeypox (due to short incubation time, can be ruled out during quarantine when no suspected symptoms appear)
SIV (Simian immunodeficiency virus) / HIV	Cowpox
HSV (Herpes-simplexvirus)	Ebola / Marburg virus (due to short incubation time, can be ruled out during quarantine when no suspected symptoms appear)
HBV (Hepatitis B-virus)	Lassa virus (due to short incubation time, can be ruled out during quarantine when no suspected symptoms appear)
Borna virus (VSBV-1)	HAV (hepatitis A-virus)
	Yellow fever
	Rabies (based on origin of animal extra surveillance is implemented)
	CMV (cytomegalovirus)
	SARS-corona 1 and 2
Parasites	
***Ancylostoma* sp (Nematode)**	*Toxoplasma gondii* (Protozoan)
***Ascaris* sp (Nematode)**	
***Baylisascaris procyonis / columnaris* (Nematode)**	
***Capillaria* (Nematode)**	
***Cestoda* (Platyhelminth)**	
***Cystoisospora canis* (Sporozoan)**	
***Eimeria* sp (Sporozoan)**	
***Entamoeba histolytica / nuttalli, E His / Dis* (Protozoan)**	
Enterobius vermicularis (Rhabditida)	
***Giardia* sp (Protozoan (flagellate))**	
***Nematodirus* sp (Nematode)**	
***Oxyurid* sp (Nematode)**	
***Sarcoptes scabiei* (Arthropod)**	
***Strongyloides* (Nematode)**	
***Trichuris* sp (Nematode)**	
Taenia sp (Platyhelminth)	
Toxascaris sp (Nematode)	
Trematoda sp (Platyhelminth)	

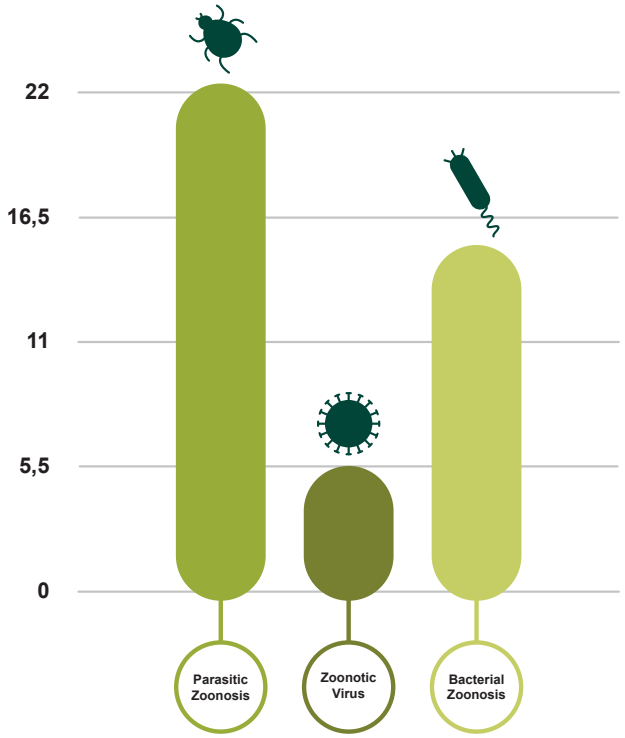


Figure 3: ***Number of exotic pets with detected parasitic, viral or bacterial zoonotic pathogens.***

Of the 262 animals coming directly from private owners, 22 animals (8.4 %) carried a parasitic zoonosis. 5 animals (1.9 %) carried a zoonotic virus, and 15 animals (5.7 %) carried a bacterial zoonosis.

At intake, all animals rescued by AAP undergo a mandatory quarantine period of 6 to 12 weeks depending on the species, during which their health status is carefully examined and monitored and medical issues are treated. During their time in quarantine, the animals are tested and monitored for zoonotic infections according to strict species- or taxon-specific procedures, based on guidelines of the World Organization for Animal Health (OIE-list)[32], with a specific focus on zoonoses that are currently emerging in Europe or that have a high potential for emergence in Europe. Zoonotic pathogen testing is always carried out for the bacteria, viruses and parasites listed in column A of table 1. When there are symptoms or specific indications related to the background or origin of the animal[33], additional testing is done for the pathogens reflected in Column B of table 1.[34]

Zoonotic pathogen detection is done through various screening methods. All primates are for example screened for tuberculosis (*Mycobacterium spp.*) by tuberculin skin test conducted multiple times. When test results are positive, additional testing is done by X-ray, culture or PCR. Additionally, primates are tested for zoonotic viral infections by serology (antibodies), and when positive by PCR (DNA/RNA). In rodents, *mycobacteria* spp are checked by Ziehl-Neelsen staining of faeces. For all animals, repeated faecal culture is performed to screen for the presence of pathogenic bacterial agents. A general screening for parasitic agents (helminths and protozoa) is done multiple times by light microscopy, and when determination on parasite species-level is needed, PCR is performed. With parasitology and bacteriology, a general screening is done, which can reveal unexpected pathogens. Only a few of the pathogens AAP tests for are species-specific. Most have the ability to cross species-barriers. These tests during quarantine offer the best possible indication of the zoonotic pathogens that the exotic pets were carrying, either during their stay with their private owner or during their time astray.

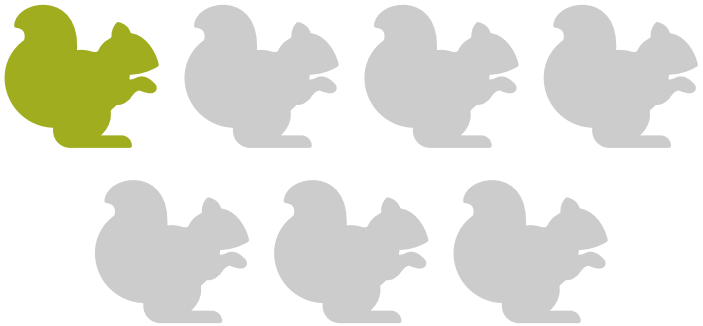


Figure 4: ***1 in 7 exotic pets rescued by AAP carried a zoonotic pathogen upon arrival.***

The zoonotic pathogen testing results revealed that of the 262 exotic pets included in the analysis, 36 animals (13.7%), carried one or more parasitic, viral or bacterial zoonotic pathogens. In other words, roughly 1 in every 7 exotic pets rescued by AAP carried at least one zoonotic agent upon arrival. 13 of those 36 infected animals (36%) carried multiple zoonotic pathogens.

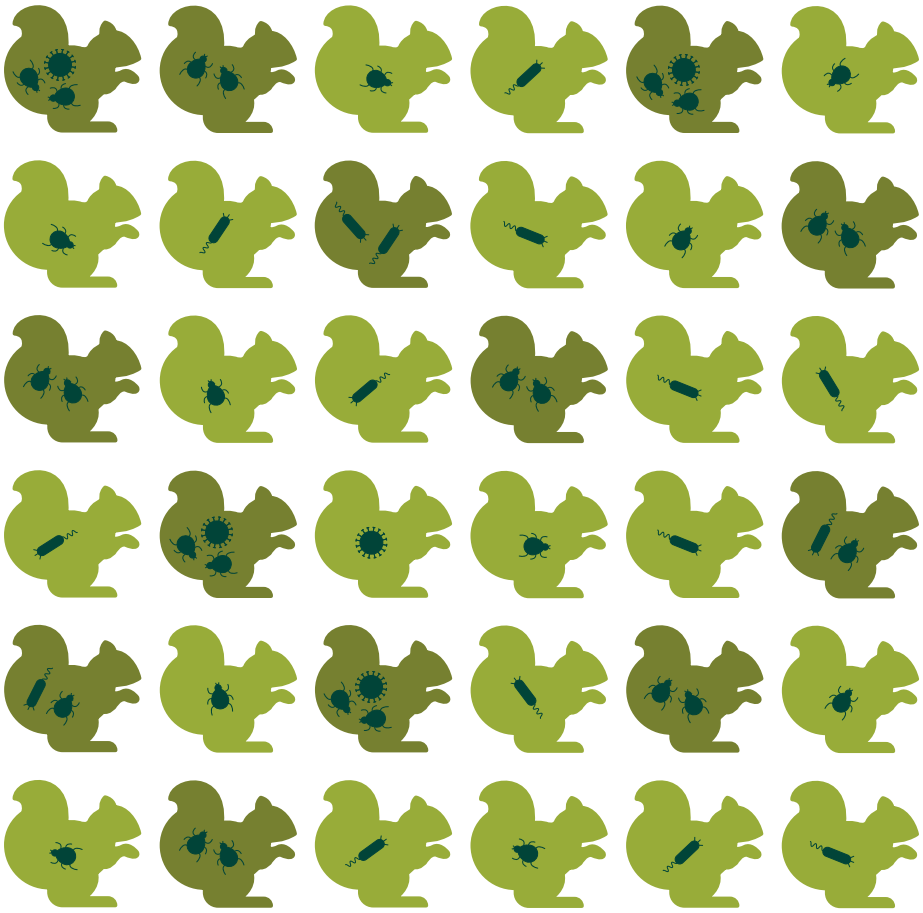


Figure 5: ***13 out of 36 infected exotic pets carried more than one zoonotic pathogen.***

Furthermore, the testing results revealed that 1 in every 2 stray animals rescued carried at least one zoonotic agent upon arrival. Of the 78 stray animals included in the analysis, 39 (50%) carried one or more parasitic or bacterial zoonotic agents. No viral zoonoses were detected in these animals. Of the 39 infected animals, 14 animals (36%) carried more than one zoonotic agent.

The results of diagnostic testing carried out by AAP are always registered. Relevant authorities are also notified in case of high-risk zoonoses, as are the previous owners in case the detected pathogens pose potential risks for human health.[35] Depending on the infectious agent and the advice of the authorities, the animal concerned is monitored and treated or – in the worst cases – euthanized.

The findings of our analysis also show that the zoonotic pathogens carried by exotic pets are varied. The detected zoonotic pathogens included 2 viruses (*Simian T-lymphotropic virus and Herpes-simplexvirus*), 4 bacteria (*Clostridium difficile, Yersinia pseudotuberculosis, Campylobacter spp and Salmonella spp*) and 14 parasites (*Ancylostoma sp, Ascaris sp, Baylisascaris procyonis/columnaris, Capillaria, Cestoda, Cystoisospora canis, Eimeria sp, Entamoeba histolytica/nuttalli - E His/Dis, Giardia sp, Nematodirus sp, Oxyurid sp, Sarcoptes scabiei, Strongyloides, Trichuris)*. The animals carrying these pathogens comprised 26 different mammal species, including several primate species[36], as well as the American red squirrel, variegated squirrel, Siberian chipmunk, American mink, raccoon, raccoon dog, coati, Bennet's Wallaby, silver fox, arctic fox, lion, puma, serval, leopard cat and genet. These findings illustrate that zoonotic pathogen detection in exotic pets is not simply a matter of screening for a few pathogens in some high-risk species, but requires comprehensive testing of all species.

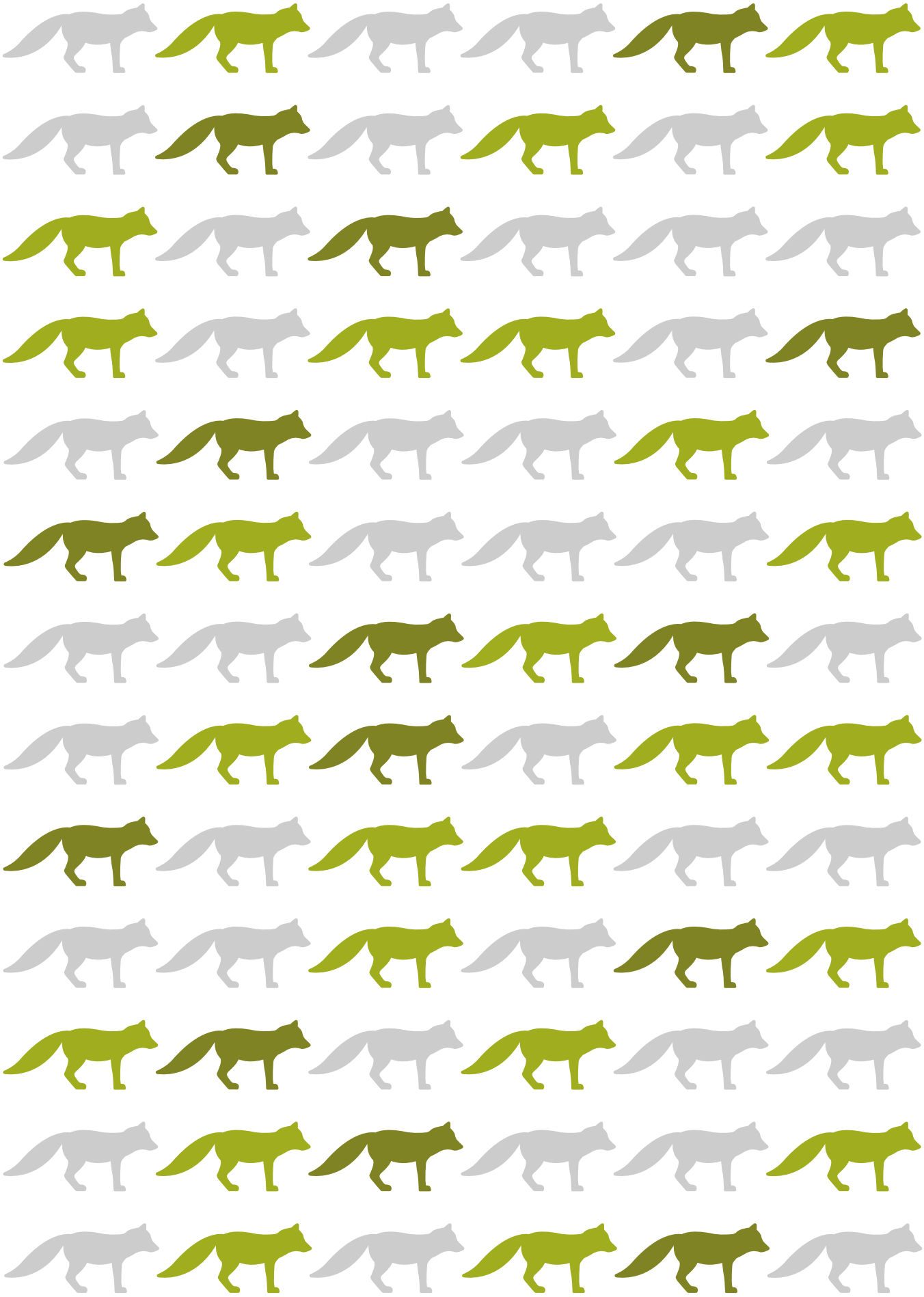


***Figure 6:* 1 in every 2 stray animals rescued by AAP carried a zoonotic pathogen upon arrival.**

39 of the 78 animals rescued astray (50%), carried one or more parasitic or bacterial zoonotic agents. Of these 39 animals, 14 animals (36%) carried more than one zoonotic agent.

Viruses

HSV (Herpes Simplex Virus): Many non-human primates carry viruses related to the Herpes Simplex Virus in humans. These viruses can remain latent and asymptomatic in some primate species, while leading to severe or fatal disease in others. Infected primates can also infect humans. In humans, herpes simplex virus – a lifelong virus – can cause painful blisters or ulcers at the site of infection, ranging from mild to severe. In newborn infants (neonatal herpes), HSV can lead to lasting neurologic disability or death.

STLV (Simian-T-lymphotropic virus): Simian-T-lymphotropic virus (STLV), also called Simian T-cell leukemia virus, is a retrovirus in primates that can be transmitted to humans. In humans, it presents itself as the genetically similar Human T-lymphotropic virus (HTLV). HTLV infections can cause T-cell leukemia/lymphoma; a cancer of the immune system's T-cells that is often fatal. HTLV can also cause several diseases to the neurological system such as tropical spastic paraperesis or myelopathy, as well as inflammatory disorders.

Parasites

Baylisascaris procyonis: A roundworm frequently found in raccoons that can be transmitted to other species, usually through accidental ingestion of infective eggs in soil, water, or on objects that have been contaminated with feces. While human infections are relatively rare, they can lead to severe symptoms and even be fatal. In humans, these migratory parasitic larvae can invade different organs, leading to blindness, inflammatory reactions, loss of muscle control, tissue damage, coma or acute eosinophilic meningoencephalitis.

Strongyloides: *Strongyloides* spp larvae can be carried by primates for example and can be transmitted to humans, primarily through contact with contaminated soil. When the larvae come in contact with skin, they are able to penetrate it and migrate through the body, finding their way to the small intestine where they burrow and lay their eggs. In humans, this can lead to skin symptoms, abdominal pain, diarrhea and weight loss. In some people it can also lead to severe, life-threatening conditions through hyperinfection.

Bacteria

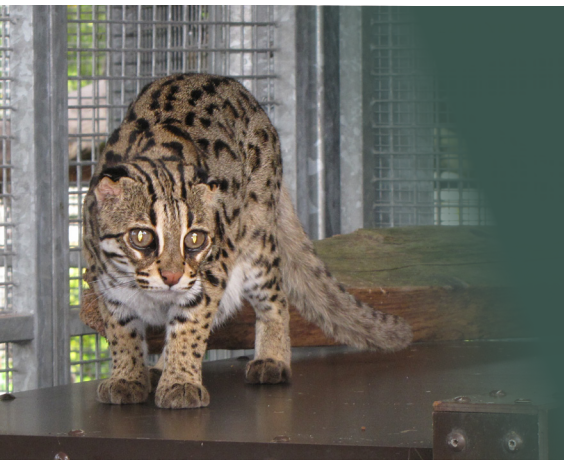
Clostridium spp: *Clostridium* species are bacteria that inhabit soils and the intestinal tract of animals and humans. The *Clostridium* genus contains more than 100 species. Infection with *Clostridium* bacteria can lead to diarrhea, fever, loss of appetite, dehydration and abdominal pain. Some bacteria, such as *Clostridium difficile*, can cause more serious symptoms, such as severe inflammation of the colon, enlargement of the colon and sepsis.

Campylobacter: *Campylobacter* bacteria can be carried in the intestines, liver, and other organs of animals that show no signs of illness. These bacteria can for example be transferred through ingestion of infected animal meat or through contact with infected animals. Humans infected with *Campylobacter* usually have diarrhea (often bloody), fever, and stomach cramps, as well as nausea and vomiting. In people with weakened immune systems, *Campylobacter* can spread to the bloodstream and causes life-threatening infections.

While the results of our analysis shed light on the prevalence of zoonotic pathogens in exotic pets rescued by AAP, it is worth noting that this analysis shows only part of a larger picture. Even the most diligent zoonotic pathogen screening comes with inherent limitations, as animals cannot be tested for every single pathogen on the planet. Even as animals undergo thorough screening, it cannot be ruled out that they may still carry other pathogens for which they were not tested. This makes interaction with exotic animals never fully risk-free. Furthermore, the exotic pets and stray animals included in this analysis were the ones for whom AAP had space available between 2016 and 2020, but these only comprise a small fraction of the exotic pets for which AAP receives rescue requests. For every exotic pet rescued, there are many more on our waiting lists and even more still out there within the EU. For all the exotic pets that are still on our waiting list and are still being kept by private owners, it is unclear if they are being, or have ever been, properly screened and treated for zoonotic pathogens. Likelihood suggests that many of them are carrying undetected pathogens.

Olive baboons

In 2017, a group of eight olive baboons were in urgent need of rescue after their German private owner passed away. The group comprised seven females and one male, between the ages of 18 months and 12 years, who were kept in an enclosure with an indoor and outdoor space. The animals were all captive-born and kept in Emsland, Germany, where the owner had a small café and restaurant. According to the deceased owner's daughter, the animals were completely healthy. Upon intake at AAP, the health screening conducted during quarantine revealed that all eight animals carried parasites (Trichuris and Entamoeba histolytica, E.His/Dis) and four of them had a viral infection (STLV/HTLV).



Leopard cat

A leopard cat, captive-bred in Germany, was sold to a private individual in the Netherlands. In the Netherlands, the animal roamed freely within the house of his new owner, together with their house cat. The leopard cat would bite whenever anyone tried to pick him up, rarely allowed petting and attacked the owner's young child. The owner did not feed meat to the leopard cat, after it had attacked him and the house cat while he was cooking chicken. In 2017, the owner decided to rehome both his animals after being diagnosed with cat allergies. AAP took in the leopard cat. The owner indicated that the animal was up-to-date on vaccinations and disease-free. During quarantine at AAP, zoonotic pathogen tests revealed that, unbeknownst to the owner, the leopard cat carried multiple bacterial agents (Clostridium and Campylobacter).

Common marmosets

In 2006, a man living in the northern part of the Netherlands started collecting common marmosets, unaware that these primate species are not allowed to be kept as pets according to Dutch laws. His collection started with a marmoset couple that he purchased from a truck driver in Poland. By the time the Dutch authorities confiscated the illegally kept animals in 2014, the man had acquired a total of 19 common marmosets. The animals were subsequently transferred to AAP, where six of the animals were found to carry the Yersinia pseudotuberculosis bacteria. Three of the infected animals died during quarantine and the remaining three were successfully treated. AAP reported back to the owner that this zoonotic bacteria had been detected, but whether or not the owner took any follow-up steps to safeguard his own health remains unclear.

Striped skunks

In 2014, ten striped skunks were confiscated by the authorities from a private owner in the Netherlands who kept and bred the animals. The owner indicated she had dewormed her animals using medication for dogs and cats. Upon confiscation, the skunks were transferred to AAP, where pathogen tests revealed that the animals were infected with Baylisascaris columaris, a large roundworm commonly found in skunks, which has zoonotic potential. One of the skunks died during quarantine because of poor health conditions. The owner was informed about the zoonosis detected, as an infection with Baylisascaris spp. can have severe health consequences in humans, including blindness, coma and even death. The owner nevertheless continued to buy and breed skunks after this confiscation, leading to another rescue request in 2016.

How can this happen in the EU?

EU law poses strict safety requirements before a stuffed toy animal can be brought into the common market[37], yet live wild animals can still be imported and traded as exotic pets in the EU with hardly any restrictions. EU regulations only place limitations on the trade in endangered species caught in the wild[38] and invasive alien species[39], but these regulations cover a mere fraction of the animal species that are present in the exotic pet trade. The vast majority of the world's wild animal species can still be legally imported, traded and kept as exotic pets under EU law. These EU regulations also focus on the protection of biodiversity, but do not address the animal health and welfare nor the public health and safety risks of the exotic pet trade.

The EU Regulation 2016/429 on transmissible animal diseases ("Animal Health Law"), which was adopted by the European Parliament and the Council in March 2016[40], is insufficiently equipped to fill this gap. The EU Animal Health Law (AHL) aims to "support the EU livestock sector in its quest towards competitiveness and safe and smooth EU market of animals and of their products, leading to growth and jobs in this important sector".[41] Consequently, while excellent in many ways, the AHL does not focus on wildlife diseases and was not designed with the exotic pet trade in mind. This shows for example in the definition of 'pet animal' in the AHL, which does not cover all mammal species that are kept as pets in the EU.[42] Furthermore, the zoonotic

Silver Fox *(Vulpes vulpes)*

diseases monitored under the AHL are largely restricted to farm animal-linked diseases and do not include many of the potentially dangerous diseases that can (also) be transmitted by exotic pets, such as STLV (Simian-T-lymphotropic virus), HSV (Herpes-simplexvirus), SIV (Simian immunodeficiency virus), monkeypox, Ebola, bornavirus, hepatitis B and baylisascaris. Exotic pets are also exempt from the registration, record-keeping and traceability requirements that apply to other animals and animal products. As a result, national authorities have no comprehensive overview of which exotic animals are being kept within the country, where they are being kept and in what numbers. This makes prevention, early detection and rapid response to exotic pet-linked zoonoses extremely challenging. In addition, the AHL only covers several *known* zoonotic diseases, but it cannot prevent the introduction of currently unknown pathogens, many of which are likely to still hide in wild animals.

The majority of the world's wild animal species can be legally imported, traded and kept as exotic pets in the EU.

The precautionary measures specified in the AHL[43] also require serious diagnostic and treatment capacities that are not readily available for exotic pets. The AHL requires 'sufficiently[44] trained' veterinarians, but some EU Member States, such as Lithuania, have no veterinarians at all who are trained in the detection and treatment of diseases in wild and exotic animals. In other countries like the Netherlands, where there are some specialized vets for wild and exotic animals, there are strong indications that this type of specialized care is not widely available throughout the territory. We also cannot expect general veterinary practitioners to diagnose and treat the huge range of exotic species that may be presented to them. As one vet so perfectly articulated: "How can we be expected to treat an animal when we have to ask the owner what it is first?"[45]

- Exotic pet trade and ownership is growing exponentially.
- The EU is one of the largest markets in the world for exotic pets.
- There is no comprehensive overview of where, which and how many exotic animals are being kept.
- Detection of zoonoses requires specialized knowledge and facilities that are often lacking or non-existent.
- National regulations are diverse, divergent and sometimes contradictory.
- Appropriate regulation at the EU level is lacking.

An added complexity here is that many zoonotic pathogens do not affect the wild animal host negatively, and thus remain unnoticed, while they can still be dangerous or potentially lethal to humans. Wild animals also have natural instincts to not show signs of illness or weakness as a protection mechanism against predators and competitors. These instincts persist when the animals are kept as pets. As a result, pathogens and illnesses in exotic pets can easily remain invisible and undetected, unless they are specifically screened, which – in light of the limited veterinary capacities for wild and exotic animals – is very rare. This is corroborated by our analysis, which revealed that many exotic pets indeed carried zoonotic pathogens that had remained undetected until the animals arrived at AAP's highly specialized quarantine facilities.

We also cannot rely on exotic pet owners or the industry to be aware of and take precautionary measures to prevent zoonotic disease risks. Research has shown that exotic pet owners are not only unaware

of their pet's complex health and welfare needs[46], but also tend to emotionally disconnect their pet from their wild conspecifics and construct the (erroneous) belief that their pet is disease-free.[47] Studies have also shown that people interested in keeping an exotic pet are rarely dissuaded from doing so, even when they are aware of the potential risks.[48]

As the above challenges illustrate, the current EU regulatory framework is unfit to adequately prevent, detect and respond to exotic pet-linked zoonotic diseases. Furthermore, true prevention requires a precautionary approach that does not simply monitor and react to zoonotic threats as they emerge, but actually limits the human-animal interactions that cause these threats to arise in the first place.

American Red Squirrel *(Tamiasciurus hudsonicus)*

Such a precautionary approach is still lacking. Even as we are reeling from the COVID-19 pandemic, very little, if any, regard is paid to the human-wild animal interactions that continue unabated within the EU and could lead to the next zoonotic disease outbreak. Strikingly, even at the height of the COVID-19 pandemic, the exotic pet trade continued largely uninterrupted[49], including through exotic animal fairs that bring humans and a huge variety of wild animal species into close physical proximity.[50]

The current EU regulatory framework is unfit to adequately prevent, detect and respond to exotic pet-linked zoonotic diseases.

Finally, this limited regulation of the exotic pet trade at EU-level might have been slightly less problematic if all EU Member States had solid regulations at national level, but this is not the case. On the contrary, national regulations on the exotic pet trade are splintered, extremely divergent and sometimes downright contradictory between Member States. While several EU Member States have adopted Positive Lists that only permit the trade and keeping of animal species that have been assessed as safe and suitable pets, most Member States have only outlawed a few of the problematic species or do not regulate the trade at all.[51] The differences in national regulatory frameworks can be extreme, even between neighboring countries. For example, Luxembourg and Belgium have adopted Positive Lists that only allow 30-45 mammal species as pets, whereas in Germany and France, 95-99.9% of the 5,488 known mammal species on earth are still allowed to be traded and kept.[52] This patchwork of regulations cannot be relied upon to effectively prevent the introduction of exotic pet-linked zoonotic diseases into EU territory. In the next section, we therefore offer our recommendations for a more comprehensive, precautionary and harmonizing approach at EU-level.

Serval *(Leptailurus serval)*

Lion *(Panthera leo)*

Conclusions and recommendations

The exotic pet trade remains largely under-regulated within the EU, despite known risks to animal health and welfare, biodiversity protection, and public health and safety. When zooming in on the zoonotic disease risks, it becomes clear that the exotic pet industry provides a large-scale mechanism for potential pathogen transmission. By bringing an extremely wide variety and large volume of wild animal species – which are particularly prone to carry known as well as unknown zoonotic pathogens – into close contact with humans and other animal species that they have not interacted with before, the exotic pet trade increases zoonotic spill-over risks. These risks are real, as evidenced by AAP's analysis of zoonotic pathogen detection in exotic pets rescued from ten different EU Member States between 2016 and 2020. This analysis revealed that roughly one in seven exotic pets rescued by AAP in this timespan carried at least one potentially dangerous zoonotic pathogen. In the case of rescued stray animals, the prevalence of potentially dangerous zoonotic pathogens was a staggering 50%.

The current EU regulatory framework is not equipped to offer sufficient protection against these zoonotic disease risks. EU regulations place limitations on the trade in wild-caught endangered species and invasive alien species, while still allowing the vast majority of the world's wild animal species to be freely imported, traded and kept as exotic pets. Furthermore, the EU Animal Health Law was designed with the agricultural sector in mind and fails to prevent, detect and rapidly respond to the zoonotic disease risks posed by the exotic pet trade. As a result of this limited regulation and lack of proper health screening for exotic pets brought into and kept within the EU, zoonotic infections in exotic pets remain largely undetected and can continue to fester.

To truly prevent the risks of future pandemics, it is paramount that the root causes of zoonotic disease outbreaks – including the ever-increasing human interaction with wild animals through the exotic pet trade – are addressed. Such prevention is not only the safe thing to do, it is also the economically smart option. The global response to the COVID-19 pandemic has already cost us 11 trillion USD and counting, with another projected 10 trillion USD in lost earnings.[53] Yet the estimated costs of preventing future zoonotic outbreaks are 22 to 31 billion USD per year; a mere 2% of the COVID-19 response costs.[54]

Luckily, this much-needed preventive approach to the exotic pet trade lies within reach and can be achieved with an EU Positive List of safe and suitable pets. The EU Positive List is a 'white list' of animal species permitted to be traded and kept as pets in the EU, on the basis of a comprehensive risk assessment by experts that takes into account animal welfare, biodiversity and public health and safety risks. All animal species not included on the list are automatically prohibited. The Positive List has already been successfully implemented in several EU Member States[55] where it has proven itself as a clear, transparent, effective, easily enforceable and efficient form of regulation.[56] The adoption of an EU Positive List to regulate the exotic pet trade would furthermore be fully in line with the precautionary principle, which is already applied by the EU in various other sectors that pose potential risks to public health, such as food additives. According to the European Court of Justice, the Positive List is also a legally valid means to restrict the intra-EU trade in exotic pets.[57] Furthermore, in line with article 114 of the Treaty of the Functioning of the EU, the EU Positive List would also serve to harmonize the currently extremely divergent national laws on the exotic pet trade, which are creating internal market distortions. Within a splintered regulatory framework, the EU Positive List offers the urgently-needed closing piece of legislation to effectively and efficiently prevent the risks stemming from the exotic pet trade. As also reflected in the Biodiversity Strategy for 2030, the EU aspires to play a leading role in protecting biodiversity and building resilience against future zoonotic disease outbreaks.[58] We urge the EU to urgently put this commitment into action, by regulating the exotic pet trade with an EU Positive List.

Rhesus Macaque *(Macaca mulatta)*

Endnotes

1 In February 2020, an opinion poll of Savanta ComRes, commissioned by AAP Animal Advocacy and Protection and Eurogroup for Animals, revealed that 87% of surveyed EU-citizens agree that exotic animals should not be kept as pet; 92% agree that the trade in exotic animals as pets should be better regulated; and 88% agree that the EU should play a greater role in regulating this issue. The poll was conducted in Italy, France, Germany, Finland, Spain and Poland and the results are available here: https://www.aap.nl/uploads/inline-files/Savanta%20ComRes_Exotic%20Pets%20Research%20for%20Eurogroup%20for%20Animals_Feb2020_v3_0.pdf

2 Toland et al., 'Turning Negatives into Positives for Pet Trading and Keeping: A Review of Positive Lists', Animals (2020), 10:12, 2371, available at: https://doi.org/10.3390/ani10122371

3 European Parliament Directorate-General for External Policies of the Union (2017) 'EU trade policy and the wildlife trade', available at: https://op.europa.eu/en/publication-detail/-/publication/b766ff88-e461-11e6-ad7c-01aa75ed71a1/language-en

4 Fediaf, 'European Facts & Figures 2019', available at: http://www.fediaf.org/images/FEDIAF_facts_and_figs_2019_cor-35-48.pdf .

5 For example, a study conducted in Germany between 2010 and 2014 found 10,120 individuals of 291 exotic mammal species offered on just two of the major German online sale platforms. (ProWildlife (2015) 'Endstation Wohnzimmer: Exotische Säugetiere als Haustiere", available at: https://www.prowildlife.de/wp-content/uploads/2016/02/Endstation_Wohnzimmer_Exotische_Saeuger_2015.pdf) In the Netherlands, 55 different mammal species were found in the trade in a three-month monitoring period in 2019. AAP (2019) 'Alive and Kicking: The exotic mammal trade in the Netherlands', available at: https://www.aap.nl/uploads/inline-files/Alive-and-kicking.pdf

6 AAP Animal Advocacy and Protection is a rescue centre for primates and other exotic, non-domesticated mammals, with locations in the Netherlands and Spain. For nearly fifty years, AAP rescues and rehabilitates exotic mammals in need from all across the EU, most of whom were formerly kept as pets, used in the circus industry, or illegally traded. AAP utilizes its rescue expertise to advocate for policy and legislative changes at national and EU-level that effectively protect the welfare of exotic mammals and prevent future rescue needs.

7 According to UN Comtrade Database 2020. Mariana Napolitano Ferreira, Wendy Elliott, Rachel Golden Kroner, Margaret F. Kinnaird, Paula R. Prist, Paula Valdujo and Mariana M. Vale, 'Drivers and Causes of Zoonotic Diseases: An Overview', Parks Journal (2021) volume 27, available at: https://parksjournal.com/wp-content/uploads/2021/03/Ferreira_et_al_10.2305-IUCN.CH_.2021.PARKS-27-SIMNF.en_-1.pdf

8 Federation of Veterinarians of Europe, (2013), Position Paper: 'Regulation of keeping animals as companion animals through the establishment of lists', FVE/013/pos/006, available at: https://www.fve.org/cms/wp-content/uploads/006_fve_position_on_positive_lists_of_exotic_species_final.pdf. Royal Dutch Veterinary Association (KNMvD) (2020) 'Position Paper – Positive List', available at: https://www.knmvd.nl/app/uploads/2021/01/201223-KNMvD-position-paper-positieflijst.pdf. Eurogroup for Animals and AAP (2017) 'Think Positive: Why Europe needs 'Positive Lists' to regulate the sale and keeping of exotic animals as pets', available at: https://www.aap.nl/uploads/inline-files/171101%20THINK%20POSITIVE%20BROCHURE%202017%202_0.pdf

9 Morton, O., Scheffers, B.R., Haugaasen, T. et al., 'Impacts of wildlife trade on terrestrial biodiversity', Nat Ecol Evol (2021) 5, 540–548. Available at: https://doi.org/10.1038/s41559-021-01399-y

10 Lockwood et al., 'When pets become pests: the role of the exotic pet trade in producing invasive vertebrate animals', Frontiers in Ecology and the Environment (2019) 17:6. Available at: https://doi.org/10.1002/fee.2059

11 Rothman-Ostrow et al., 'Covid-19 - Zoonosis or Emerging Infectious Disease?', Frontiers in Public Health (2020). Available at: https://doi.org/10.3389/fpubh.2020.596944

12 Smith, K.F., et al., 'Global rise in human infectious disease outbreaks', Journal of the Royal Society Interface, (2014) 11:101. Available at: https://royalsocietypublishing.org/doi/full/10.1098/rsif.2014.0950

13 Lin-Fa Wang, Danielle E Anderson, John S Mackenzie, Michael H Merson, 'From Hendra to Wuhan: what has been learned in responding to emerging zoonotic viruses' The Lancet (2020) 395:10224. Available at: https://doi.org/10.1016/S0140-6736(20)30350-0

14 UNEP (2020) 'Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission', available at: https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and ; Jones, K., Patel, N., Levy, M. et al., 'Global trends in emerging infectious diseases', Nature (2008) 451, 990–993 (2008). https://doi.org/10.1038/nature06536 ; Louise H. Taylor, Sophia M. Latham, Mark E.J. Woolhouse, 'Risk factors for human disease emergence', The Royal Society (2001) 356(1411):983-9. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1088493/pdf/TB010983.pdf

15 B. B. Chomel, A. Belotti, F.X. Meslin, 'Wildlife, Exotic Pets and Emerging Zoonoses', Emerg Infect Dis. (2007) 13(1): 6–11. Available at: 10.3201/eid1301.060480 ; Souza, M.J., 'Bacterial and Parasitic Zoonoses of Exotic Pets', Veterinary Clinics of North America: Exotic Animal Practice (2009) 12:3, pp. 401-415. https://www.sciencedirect.com/science/article/abs/pii/S109491940900036X?via%3Dihub

16 V. Nijman, 'Illegal and Legal Wildlife Trade Spreads Zoonotic Diseases', Trends in Parasitology (2021) 37:5, 359-360. Available at: https://doi.org/10.1016/j.pt.2021.02.001

17 Karesh WB, Cook RA, Bennett EL, Newcomb J Wildlife trade and global disease emergence. Emerg Infect Dis (2005) 11:1000–2. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3371803/

18 Ibid.

19 C. Warwick, P.C. Arena, C. Steedman, M. Jessop, 'A review of captive exotic animal-linked zoonoses', J. Environ. Health Res. (2012) 12:1, pp. 9-24, http://emergentdisease.org/assets/documents/A_review_of_captive_exotic_animal-linked_zoonoses.pdf

20 S.S. Morse, J.A.K. Mazet, M. Woolhouse, C.R. Parrish, D. Carroll, W.B. Karesh et al., 'Prediction and prevention of the next pandemic zoonosis', The Lancet (2012) 380:9857, pp. 1956-1965. Available at: https://doi.org/10.1016/S0140-6736(12)61684-5; J. Recht, V. J. Schuenemann, M. R. Sánchez-Villagra, 'Host Diversity and Origin of Zoonoses: The Ancient and the New', Animals (2020) 10:9, 1672. Available at: https://doi.org/10.3390/ani10091672 .

21 https://www.aap.nl/en/news/aap-reveals-many-exotic-animals-kept-europe-carry-dangerous-diseases-potentially-lethal-humans

22 Giessen, Van der JWB, et al. (2010) 'Emerging zoonoses: Early warning and surveillance in the Netherlands', RIVM report 330214002/2010. Available at: https://rivm.openrepository.com/bitstream/handle/10029/259646/330214002.pdf?sequence=3

23 AAP (2020) 'Under their skin: Zoonotic threats from exotic mammal pets'. Available at: https://www.aap.nl/uploads/inline-files/Zoonotic%20threats%20from%20exotic%20mammal%20pets.pdf

24 IPBES (2020) 'Workshop Report on Biodiversity and Pandemics', available at: https://ipbes.net/sites/

default/files/2020-11/20201028%20IPBES%20Pandemics%20Workshop%20Report%20Plain%20Text%20Final_0.pdf

25 R. Nuwer, 'Many exotic pets suffer or die in transit and beyond – and the U.S. government is failing to act' 2021 National Geographic, available at: https://www.nationalgeographic.com/animals/article/exotic-pets-suffer-wildlife-trade.

26 For example, in April 2021, the Italian Senate adopted a law that also provided a ban on the importation and keeping of exotic and wild animals (https://www.lav.it/en/news/ban-trade-import-wild-animals). In several EU Member States, such as the Netherlands and Sweden, governments have mandated committees to investigate zoonotic disease risks and propose additional policy responses. Recommendations for a better regulation of wildlife trade to prevent zoonotic disease outbreaks can also be found in numerous publications, such as: UNEP (2020) 'Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission', available at: https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and; UNEP (2021), 'Making peace with nature: A scientific blueprint to tackle the climate, biodiversity and pollution emergencies', available at: https://www.unep.org/resources/making-peace-nature ; IPBES (2020) Workshop Report on Biodiversity and Pandemics, available at: https://ipbes.net/sites/default/files/2020-11/20201028%20IPBES%20Pandemics%20Workshop%20Report%20Plain%20Text%20Final_0.pdf. A. Borzée et al. 'COVID-19 Highlights the Need for More Effective Wildlife Trade Legislation', Trends in Ecology & Evolution (2020), 35:12, pp. 1052-1055, available at: https://doi.org/10.1016/j.tree.2020.10.001

27 Anna Rovid Spickler (2015) 'Transmission of Zoonoses Between Animals and People', MSD Manual, Veterinary Manual, available at: https://www.msdvetmanual.com/public-health/zoonoses/transmission-of-zoonoses-between-animals-and-people

28 The five main routes of zoonotic pathogen transfer are (1) inhalation, (2) ingestion, (3) non-traumatic contact, (4) traumatic contact and (5) via an arthropod vector. Merson, M.H., et al, (2005) International Public Health, Diseases, Programs, Systems and Policies.

29 AAP (2020) 'Under their skin: Zoonotic threats from exotic mammal pets'. Available at: https://www.aap.nl/uploads/inline-files/Zoonotic%20threats%20from%20exotic%20mammal%20pets.pdf

30 These Member States were: Spain, the Netherlands, France, Belgium, Germany, Austria, Portugal, Cyprus, Greece and Hungary.

31 14 animals were excluded from the analysis, because, while they had been privately owned in the past, they were owned for more than five years by a zoo or circus before intake at AAP.

32 https://www.oie.int/animal-health-in-the-world/oie-listed-diseases-2021/

33 Any available information on vaccinations or veterinary consults of the exotic pet prior to rescue are registered.

34 None of the animals included in this study displayed symptoms that warranted the additional testing of the zoonotic agents mentioned in column B of table 1.

35 This happens particularly in the case of detection of Mycobacterium bovis/tuberculosis, Yersinia pseudotuberculosis and positive virology (e.g. Hepatitis B). Whether the previous private owners get tested upon receiving this information is unclear.

36 Primates included the following species: olive baboon, lemur, tamarin, vervet monkey, talapoin monkey, Barbary macaque, black-capped capuchin, squirrel monkey, marmoset.

37 EU Directive 2009/48/EC of 18 June 2009 on the safety of toys, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02009L0048-20181126

38 EU Regulation No. 338/97 of 9 December 1996 on the protection of species of wild fauna and flora by regulating trade therein, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX-:31997R0338

39 EU Regulation No. 1143/2014 of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1417443504720&uri=CELEX:32014R1143

40 EU Regulation 2016/429 of the European Parliament and of the Council of 9 March 2016 on transmissible animal diseases and amending and repealing certain acts in the area of animal health (Animal Health Law), available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02016R0429-20191214

41 https://ec.europa.eu/food/animals/health/regulation_en

42 See article 4 (11) in conjunction with Annex I of the Animal Health Law, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02016R0429-20191214&from=EN#tocId386 This definition includes dogs, cats, ferrets, rodents and rabbits, but leaves out many other mammal species that can still be legally kept as pets in EU Member States, such as bats, wild or hybrid canids, wild or hybrid felines and primates.

43 Article 13 of the AHL requires EU Member States to ensure that competent authorities have (a) qualified personnel, facilities, equipment, financial resources and an effective organisation covering the whole territory of the Member State; (b) access to laboratories with the qualified personnel, facilities, equipment and financial resources needed to ensure the rapid and accurate diagnosis and differential diagnosis of listed diseases and emerging diseases; and (c) sufficiently trained veterinarians involved in performing the activities referred to in Article 12.

44 No further definitions or clarifications are given in the AHL as to what constitutes a 'sufficiently' trained veterinarian.

45 https://www.theveterinarynurse.com/opinion/article/the-exotic-pet-trade-where-do-veterinary-professionals-fit-in

46 R. A. Grant, V. T. Montrose, A.P. Wills, 'ExNOTic: Should we be keeping exotic pets?', Animals (2017) 7(6), 47, available at: https://doi.org/10.3390/ani7060047

47 Robin, C., et al., 'Pets, Purity and Pollution: Why Conventional Models of Disease Transmission Do Not Work for Pet Rat Owners', Int J Environ Res Public Health. (2017) 14:12, 1526. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5750944/

48 V. Pompe, H. Hopster, M. Van Dieren (2013) 'Liefde maakt blind? Onderzoek naar waardenoriëntaties en waardenafwegingen van kopers/houders van 'risicovolle' dieren'. Available at: https://edepot.wur.nl/265958

49 A recent study of the online exotic pet trade revealed that only 0.04% of advertisements mentioned COVID-19, mostly after the WHO declared COVID-19 a pandemic. No traders discussed the role of trade in spreading diseases; instead, advertisements stimulated the trade in wild species during lockdown. T. Q. Morcatty, K. Feddema, K.A.I. Nekaris, V. Nijman, 'Online trade in wildlife and the lack of response to COVID-19' Environmental Research (2021) vol 193, available at: https://doi.org/10.1016/j.envres.2020.110439 Research also revealed a spike in illegal wildlife seizures during the COVID lockdown and continued trade in pangolins for traditional medicine uses, even though the species had been identified as a reservoir for SARS-CoV-2. S. Sethi, 'Interconnectedness of Illegal Wildlife Trade and COVID-19' Economic & Political Weekly 2020, 55:49, available at: https://www.epw.in/journal/2020/49/commentary/interconnectedness-illegal-wildlife-trade-and.html

50 For example, in September 2020, a reptile fair took place in Houten, The Netherlands, where a large va-

riety of reptiles and amphibians as well as mammals were sold. Despite the fact that the organization (VHM events) of Exopet in Houten prohibits the presence of species like foxes, bats and skunks in its own regulations, World Animal Protection identified these animal species to be offered for sale at the fair that took place on 20 September 2020. The main exotic animal fair of Southern Europe, ExpoTerraria, also took place on 22 May 2021 in Madrid, Spain.

51 Eurogroup for Animals (2020) 'Analysis of national legislation related to the keeping and sale of exotic pets in Europe', available at: https://www.eurogroupforanimals.org/sites/eurogroup/files/2020-07/Eurogroup%20for%20Animals_Exotic%20pets%20reoprt_v5%20%281%29.pdf

52 AAP (2019) 'The Big Cat in the Room: The Problems with European Rules on Exotic Pets', available at: https://www.aap.nl/uploads/inline-files/The_big_cat_in_the_room-Problems_with_European_Rules_on_Exotic_Pets_0.pdf

53 WHO Global Preparedness Monitoring Board (GPMB), A World in Disorder: Global Preparedness Monitoring Board Annual Report 2020, available at: https://apps.who.int/gpmb/assets/annual_report/GPMB_AR_2020_EN.pdf

54 Andrew P. Dobson, et al, 'Ecology and Economics for Pandemic Prevention', Science (2020) Vol. 369, Issue 6502, pp. 379-381, available at: https://science.sciencemag.org/content/369/6502/379

55 i.e. Belgium, Luxembourg, The Netherlands, Lithuania, Malta, Croatia and Cyprus. In Lithuania and the Netherlands, the Positive List has been enshrined into the law, while the actual list itself is still being developed. Eurogroup for Animals (2020) 'Analysis of national legislation related to the keeping and sale of exotic pets in Europe', available at: https://www.eurogroupforanimals.org/sites/eurogroup/files/2020-07/Eurogroup%20for%20Animals_Exotic%20pets%20reoprt_v5%20%281%29.pdf

56 See for example: Eurogroup for Animals, The implementation of the Positive List for Mammal Pets in Belgium: A Success Story' (2016)

57 EU Court of Justice, case C-219/07 'National Raad van Dierenkwekers en Liefhebbers VZW and Andibel v Belgische Staat', ECLI:EU:C:2008:353, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX-%3A62007CJ0219

58 https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en

AAP

www.aap.nl/en

Postbus 50313 | 1305 AH Almere | The Netherlands | +31 36 523 8787 | info@aap.nl