



Prosimian TAG
EAZA

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COVID-19 CRISIS SPECIAL ISSUE

Editorial

The Corona virus pandemic has an impact on everyone of us and everyone around the world.

There are sayings about a changed world, lasting changes and a «new normal» in the course and after the pandemic. Although it feels for ages since we experienced shutdowns, we are likely only at the start of the changes.

As it is, we are in a process to find or re-define our tasks and roles. As I see it there is hardly any long-term prediction on what is right and good of our doing. We must react to changes, to needs and urgencies, must develop new scenarios and adapt our doing to these. While we all are certainly more focused on the immediate changes around us and our daily life we also should try to keep our view also on our common ambitions – as in this case the propagation and conservation of the prosimians.

This is a special edition of the Prosimian TAG Newsletter focussing on information and exemplary work in the light of the Corona pandemic.

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Balancing priorities – Running a zoo and contributing to conservation in the plight of the corona virus pandemic

By Achim Johann – Director NaturZoo Rheine and Prosimian TAG chair

On 16 March our zoo was directed to close for the public in prevention to spread the corona virus. While working procedures for the staff were already in place we saw us now confronted with a “no revenues for an unforeseeable time”-situation. Although our zoo has mandatory savings defined for use in case of temporary closure, first thoughts were on defining necessities and urgencies to ensure the quality of animal husbandry and continued employment of the staff.

Reviewing and prioritizing work and budgets and expenses led to postponing activities for the breeding-programmes – as are working on studbook and coordinating the EEP and pro-active work for the Prosimian TAG. Main efforts in work were on finding sources for financial support and on external communication.

The latter became quite a big job: When we started with daily posts on Facebook and Instagram under the headline “Behind closed doors” we reached a wide and steadily growing audience who now, in times of lockdown, also showed a



deeper going interest also in more complex topics. As there was more spare time and wish for distraction the “stories” were read and further spread. We took the chance and developed these posts on social media as a more educational tool and included conservation messages and reports on *in situ* conservation activities, too. No need to say that “stories” about people’s favourites like lemurs got highest click-and response-rates.

The lemurs also worked well for themselves when we called for donations by “adopting animals”. Again, the lemurs proved to be the crowd-pleasers and became great fund-raisers.

We also got confirmed how important zoos are for the society, for the individual well-feeling, as

social places. Arguments “pro zoo” are nowadays so much focused on their roles in conservation that the social importance of zoos isn’t widely communicated – maybe not even recognized. We answered to hundreds of calls and messages asking for the date of re-opening, we assured about the well-being of the animals and staff and we were overwhelmed by mental (and financial) support. More than obvious: the zoo respectively the opportunity to visit the zoo was widely and very much missed.

Ensuring a financial stability for the zoo for an undefined future without or with much reduced revenues via the visitors led also to reviewing the zoo’s budgets of the year. Planned investment projects (construction of new facilities) were postponed as were purchases which were not essential for the basic “running of the zoo”. We then also came across our (admitted: not so big) budget for *in situ* conservation and this was regarded also as one with a lower priority to keep-up. However, a small amount of money might be very helpful and even essential to avoid the collapse of a conservation project *in situ*. When believing in and living the “One Plan Approach” in conservation of species by involvement of zoos, we must consider – may I say: ensure – a level of support of the *in situ* activities. It won’t be easy to communicate this to institutional decision makers in a zoo while processing emergency budget revisions and cuttings. On top, we are now lacking successful fund-raising activities like “Expedition Lemur-Forest” and “Dinners for Conservation” because of the general and specific restrictions (as there is social distancing, among others).

These individual conflicts made me think about the ongoing and future work for and of the Prosimian TAG.

- As practicalities of the EEPs are hindered – for example by impossibilities of animal transports – EEP coordinators are asked to review the breeding- and transfer recommendations considering the “corona-situation”.
- Although the RCP and some LTMPs are just in place, reviewing these population-management tools might be appropriate when there is a better understanding of the impact by the corona pandemic on breeding-programmes and *in situ* conservation activities.
- Finally, the Prosimian TAG’s endorsed *in situ* conservation projects (according to the TAG’s *in situ* conservation plan) are asked to review and adapt their activities so that the zoos’ financial contributions serve in a most appropriate way. For example: would budgets in support of eco-tourism structures get better used for ensuring the hygienic and health situation for the people on site – having in mind that tourism might go down dramatically and will recover only slowly?

One idea of the Prosimian TAG was to compile this special edition of the Newsletter – for letting all know that the corona-topic has reached all of us and everyone around the world. The TAG also sees its task in communicating about worries and concerns and in the same way about good practice and success. All in the hope for a better – also in times like these.



Operation of EEPs, ESBs and TAGs
(from EAZA information circulated on
March 30, 2020)

Whilst our ambition is to continue the functionality of our EAZA Ex situ Programmes (EEP) for as much as possible, EAZA Members are likely to experience differences compared to the normal situation. Where some coordinators might have the possibility to spend more time on managing their EEP whilst working at home for example, others are under temporarily unemployment schemes or replacing members of staff that are in quarantine and thus having to deprioritise their EEP coordination activities.

Managing this unfolding crisis both professionally and privately might mean that some colleagues cannot devote the normal energy and efficiency to their EAZA tasks which the EAZA Executive Office (EEO) will respect as surely EAZA Members will as well.

Depending on the length of the crisis and the species involved there will also be implications on transfer and (non)breeding recommendations for some of our EEPs. The EAZA Executive Office will keep in touch with the EEP coordinators and will strive to at minimum ensure questions from EEP participants are acknowledged and answered wherever possible.

The same applies to EAZA Studbooks (ESBs) and Taxon Advisory Groups (TAGs).

If communication with EEPs, ESBs or TAGs breaks down, EAZA Members can contact:
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Note about Prosimian and SARS-CoV-2

By Alexis Lécu – DVM, DECZM (ZHM)
EAZWV / Infectious Diseases Working Group

SARS-Cov-2 is the responsible virus for the current CoViD-19 pandemic, is also identified as a threat to great ape conservation by both *in situ* organizations [1] and *ex situ* management stakeholders such as EAZA or AZA Taxon Advisory groups.

Genetic and physiological proximity between human beings and all non-human primates is paramount and is always leading to mirroring zoonotic threats on high profile conservation species. As a recent example, years before the current pandemic issue, one human coronavirus HCoV- OC43 [2], involved in human common cold, already showed it would be a real threat to wild population of Chimpanzees within the setting of a National Park ecotourism.

Staff taking care of lemurs in captivity, either in Madagascar or all other countries, share the same level of viral risk transmission than guards, scientist or people coming in contact with the animals in the field. With this in mind, the question of Prosimians sensibility to this new SARS-CoV-2 virus is paramount, and even more since CoVid hits Madagascar (124 official cases on the 27th of April 2020, likely more).

Molecular and genetic predictions

One of the major features of this new coronavirus, that makes him so transmissible to humans, is its affinity for one human cell receptor, called ACE2 (Angiotensin Converting Enzyme 2). The “S” (for “Spike”) glycoprotein of the virus surface is binding the ACE2 receptor of host just prior to cell invasion. Amino-Acid composition and spatial structure of ACE2 will play role for perfect match with one region of the “S” protein called Receptor Binding Domain (RBD). There is currently a lot of literature exploring the ACE2 composition, protein sequence, and genome of all animals. The objective is often to predict how well the ACE2 from one species will match with the RBD of SARS-CoV-2. Several publication [3,4] did look on several species of prosimian regarding this receptor, and the likelihood of infection it could produce as consequence of its composition. From these databases, it appears first that there is a great discrepancy between the different prosimian species:

- Coquerel’s Sifakas are unexpectedly showing the greatest identity of ACE2 with human beings (24 matching Amino Acid out of 25), theoretically making them sensitive to. Indris seem to share the same propriety.
- Very few Eulemurs were assessed, but Blue-eyed Black Lemurs (*E. flavifrons*) were classified also with “High probability” of sensitivity with 22/25 binding score.
- Other assessed species fall under the category from “Medium” (Aye-Aye) to “Low” (Flying Lemurs) and “Very Low” (Mouse Lemurs) with a lot of



modifications of their ACE2 binding sequences compared to human ones.

This area of research is very important (and doesn’t require any experiment on animals), but it is mostly designed to find relevant information about virus origin, intermediary hosts and spillover hypothesis [5]. This could not be used as raw results to conclude real abilities to be infected. For instance, within the same reference [4], ferret (*Mustela putorius*) are classified as “Very Low” regarding binding abilities, although we know that they are able to be infected, to shed virus, and capable of intraspecific transmission [6].

Other prosimian issues regarding coronavirus infection

There are around 40 reported species of coronaviruses, plus 10 under description. Most of them are species-specific, but it’s important to note a virus virus like particles were seen through Electron Microscopy in Bamboo Lemurs (*Prolemur simus*) colon content, associated to fatal digestive disorders. Although clinical signs, pathology and particle shapes were matching with coronavirus infection, all later broad range PCR never revealed any coronavirus.

In wild setting of Madagascar, lemurs are sympatric to other species that are known carriers of coronavirus: gammacoroniviruses were sampled from birds [9], and several endemic bats were also assessed to be carrier of betacoronaviruses [10], with prevalence that could be over 5% [11]. However, coronavirus shedding or seroconversion was never observed with any wild lemur study, although other virus silent circulation was already confirmed.

Ability to be infected or not is not only a matter of cell receptor genomic sequences, but also depends on lot of factors such as immunocompetence of host, physiological mechanisms of reaction towards pathogen infection, etc... The immune system of Prosimians has a lot in common with the one of other Non Human or Human Primates, with existence of a balance between cellular (lymphocytes) and humoral (antibodies) immune pathway, and the presence of cytokines (e.g. Interferon) to act as modulator/messengers. But there are also

physiological differences, such as the Basal metabolic rate, lower in lemurs than in other primates [12], often inducing a lower body temperature. This may change the ability of virus to complete some infection steps, e.g. by compromising enzymes function that trigger replication or cell fusion. Moreover, if infection is possible, we clearly do not know.

The fact is that beyond the ACE2 receptor matching issue, a lot of other parameters may play a role in lemur receptivity for this virus, and we cannot duplicate what we know from Rhesus Macaques to Prosimians.

Testing

So far, there is almost no report on testing of Prosimians. Only few Ring-tailed Lemurs were tested by PCR in Madagascar within a context of suspicion, with negative results (see [here](#)).

As in humans, animals could be tested for viral shedding (RT-PCR from nasal, tracheal or fecal swabs) and likely assessed with serological testing (to reveal different kind of antibodies against SARS-CoV-2). Although some veterinary tests are nearly available on the market (e.g. Idexx Lab.), health and veterinary authorities should give the green light to launch testing in animals. SARS-CoV-2 is now officially notifiable to OIE in animals, and therefore, investigations should be strictly framed by official veterinarians. Clear guidance on the circumstances under which animals could be tested for SARS-CoV-2, the rationale for testing animals under these circumstances, practical guidance on sampling and testing, requirements for reporting, and actions on positive findings are still needed.

Serological testing allows to look for antibodies produced in reaction to previous infection. There are already very different tests available in humans, with both different antibody target and different technique applied. Some of these techniques may detect prosimian antibodies (if any), but some other won't be able. Therefore, it is not recommended to perform exhaustive serological testing in Prosimians at this stage, as results would be unreliable without any validation.

Recommendations

Good hygiene practice and distance (1.5-2m) remain the two main prevention measures to apply to prosimian care from now on, according to the fact that lemurs will now be exposed to a human population with increasing SARS-Cov-2 prevalence. Disinfection of all provided items and food, cleaning and keeping distance from animals should be mandatory at this stage. Wearing gloves was already a recommendation towards all zoonotic hazards; supplementary recommendation in the context of this pandemic could be to enhance PPE wear, such as mask for operators that needs to be very close to animal for a work period (e.g. veterinarians intubating a lemur).

Clinical signs that could be related to SARS-CoV-2 infection in Prosimians are unknown. From what we know of experimental infection in macaques, signs could be milder than in human beings, but are likely to mostly concern respiratory and digestive tract. Then, it may be wise, waiting for more guidance from local vet authorities, to save any sample (nasal, rectal, oral swabs; serum; feces) and freeze-store it when respiratory or digestive signs occurred, are diagnosed unrelated to other etiology.

EAZWV and Infectious Diseases Working group is really leading a real time monitoring on this virus. In several countries (Switzerland, France...), studies around zoo and wild animals that were in contact with positive humans are already in progress, and may bring further information. Malagasy research and Health Institutes have also the capacity to test animals within suspicion context, and database on prosimian sensibility will increase within the next week. So far, considering that the pandemic context in a lot of countries have already allowed multiple animal contact and transmissions, even the rate of positive domestic carnivores such as cats [13, 14] is rather reassuring, and like for SARS, are more indicating that non-human animals could be "accessory" contaminated but are neither a risk of contamination for their own species, nor for human beings.

For more details information on SARS-CoV-2, please refer to the EAZW FAQ, updates are available [here](#).

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We asked to Prosimian in situ conservation representatives to share with us their thoughts and experiences about the consequences of the Covid-19 epidemic on their activities in the field and, more broadly, about how this will impact the future of their organizations. Here is what they stated.



Delphine Roulet
Helpsimus' Founder and President



«On March 20, 2020 Madagascar's President Andry Rajoelina announced the country's first confirmed cases of COVID-19. The following day, he declared a territory-wide public health emergency to contain the epidemic.



Vatovavy-Fitovinany Region

In the Vavovavy-Fitovinany region where Helpsimus operates, the objective is to help combat the virus spread.

A COVID-19 committee has been created in the Ifanadiana District (the region has 6) and we are working with local authorities and the medical NGO Pivot to provide support to the population.

The following measures have been taken:

1) At Ifanadiana District level:

- Setting up of health roadblocks and roadside checks. Helpsimus provides food and fuel to the medical staff and policemen who run these checkpoints and carry out the controls.
- The population is informed about the COVID-19 and the barrier gestures thanks to 800 posters given to the medical NGO Pivot in charge of their distribution

throughout the District of Ifanadiana.

2) At village-level:

Helpsimus had already started a program to improve hygiene and access to water in the partner villages of the Bamboo Lemur Program but it is in its early stages. Indeed, in most of our partner villages, basic hygiene rules are unfortunately yet almost non-existent. In this context, how can we even encourage the population to respect the main barrier gesture, namely regularly wash their hands? And yet, solutions exist:

- the «Tippy Tap» is a hands free system that is easy to build and saves water;
- the wood ash can replace soap. It is indeed a powerful cleaner which contains in particular potash, known to kill microbes.



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To spread this information, we have printed 600 posters on how to build a «tippy tap», the use of wood ash and hand washing.

Helpsimus has also distributed equipments (ropes, bottles...) in the villages for helping to build the «tippy taps».

Our educator Mary along with our team leaders Jacky and Riry as well as several of our guides are responsible for distributing the posters in the village where they come from in order to minimise the number of journeys and for demonstrating the building and the use of the «tippy tap».



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Last but not least, after a consultation with several wildlife veterinarians (primates and lemurs), we have decided to take precautionary measures with regard to the work of our guides. These measures correspond to the reality of our situation in the field and were compiled in a poster that we gave them.



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The current crisis has also led to the cancellation of three studies planned this Spring in Madagascar (two on

Ring-tailed Mongooses and one on Ranomafana Bamboo Lemurs) as well as to my field mission of April and the stay of 2 ecovolunteers. Unfortunately, the mission of Maryline André, consultant from Varika Conservation, on the protection of paddy fields has been cancelled too.

The study on Greater Bamboo Lemurs and Peyrieras' Woolly Lemurs conducted by 2 English students and the visit of several representatives of Yorkshire Wildlife Park to Helpsimus' conservation site had to be postponed to 2021. In the meantime, the student from Oxford University has started to process the data collected on Greater Bamboo Lemurs since several years.

Overall, like many other conservation associations, we're expecting a decrease in our financial resources this year.»



Frantisek Pribrsky
Kukang Rescue Program Director

«Indonesia is officially still one of the countries with lower numbers of infected people. Yet there are a few problems: authorities only test a small percentage of people (so no one actually knows the real numbers) and the security precautions are too weak (or people just do not follow them). The scientists and experts are thus afraid that Indonesia may soon become the most affected Asian country. If this happens, it will be a huge problem for everyone and of course for all conservation activities here in the long term.

If people lose their jobs (they usually do not have job agreements nor any social system which would help to support them), they would probably quickly turn to illegal activities - hunting animals for food, illegal trade/logging etc - even for a small amount of money. If the problem is widespread in the country it would really badly affect many wildlife species.

Currently, the biggest problem of most conservation organizations (including the largest ones that have

started to be affected) is funding (probably for most conservation NGO around the world). Sponsors and zoos (even the most important ones) are «tightening their belts» and reducing their conservation budget. Of course, this will impact the conservation organizations and their activities.

Regarding the situation of the lorises, problems would emerge if they were proven to be sensitive to the virus which isn't the case right now. Because lorises are still highly traded in the country, they are in close contact with humans.

About the situation of The Kukang Rescue Program: Since the beginning of the year due the epidemic, we have lost 3 important expected grants/donations. Therefore, I am currently struggling to find ways to get money to be able to pay the salaries of our staff here. Just like for many others, the financial issue is the biggest problem for our program, at least for now. All is happening too fast and even though I did my best to anticipate and be prepared, I was not able to prevent it.

Public schools and social events are closed or cancelled so all our school and education activities are postponed. Nevertheless, people are still working in the rescue centre and we still carry on our community engagement activities. I believe that this coronavirus crisis will hopefully not have too much long-term negative impact unless the situation in Indonesia worsens dramatically and we lose all the funding.

I personally would consider the worst scenario: of course if someone got sick and also if the team and projects (which we have built for years) started to fall apart because, for example, we would not be able to pay them.

The Covid-19 will most probably badly impact both the economy and the conservation in Indonesia. Small organizations like ours will be able to survive if the situation won't last too long and if we don't lose all our sources of funding (organizations with more sources are of course better prepared). But if the largest organizations and the government stop operating totally, then no one knows what will happen...»



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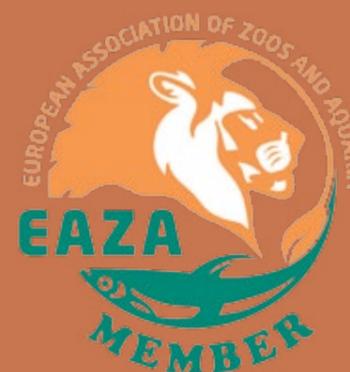
Animal Transports (from EAZA information circulated 30 March 2020)

With many borders closed across the EAZA region, the possibilities for transporting animals have decreased significantly.

Even where still allowed, EAZA strongly recommends postponing animal transports wherever possible to reduce risks of disease transmission for staff involved in these transfers and avoid long waiting times and potential refusal of entry at border inspection points.

There might be exceptional circumstances where animals do need to be transported with urgency for example severely compromised welfare of individual animals that cannot be resolved at an institutional level or where the aims of an EEP might be severely negatively impacted if transport cannot take place within the next couple of months. In some of these scenarios, transfers between EAZA Members on a national level might provide for a (temporary) solution.

In other cases, EAZA is available to attempt to help programmes and Members when seeking support from authorities to allow a crucial cross-border transport to take place. EAZA Members are asked to contact the EEP coordinators and ESB keepers as per the normal EAZA procedures for the programme species.



Human-Animal disease transmission (from EAZA information circulated on March 30, 2020)

Scientific literature on Covid-19 transmission from animals to humans and vice versa is limited in number and in those studies that are available observation and feedback times are at present far too short.

EAZA's longstanding MoU partner the European Association of Zoo and Wildlife Veterinarians (EAZWV) have made an excellent paper available (see chapter 6.5 of the Transmissible Disease Handbook) describing the current state of play. It includes examples of reassuring statements about risk of transmission. EAZWV will continue to update this paper as more scientific literature becomes available. We recommend that this paper is used by EAZA Members to address any queries about Covid-19 disease transmission.

Whilst there is still need for further research to understand the transmission of Covid19, it is important to stress that EAZA Member institutions are subject to strict local and/or European animal health legislations as well as subject to EAZA's own veterinary standards as described in the «EAZA Standards for the Accommodation and Care of Animals in Zoos and Aquaria». The main concern in the Covid-19 pandemic is disease transmission between humans. The risk of spread of disease from zoo animals to visitors is considered nil and there is no need for panic regarding the animals held by the EAZA Membership.

With most EAZA Members being closed to the public and staff with clinical symptoms not allowed to work, there is also only limited risk of disease transmission from humans to animals held in EAZA Member collections. Despite the risk being small, working in hygienic and sanitary conditions with the animals remains important. This is part of normal routine for staff at EAZA Members and indeed part of EAZAs accreditation criteria.

We do recommend EAZA members, with support of their veterinarian to, where necessary, update the animal care teams about the risk of zoonoses and that normal hygienic routines continue to apply also during the human Covid-19 pandemic. Furthermore, we recommend that zoos evaluate the need for any direct contact between staff and animals and avoid this wherever possible.

Finally, in light of the above, we would like to stress that in several countries across the EAZA region there is a shortage of masks and that those available should be made available to human health staff instead of being used for routine animal care.

Protective measures in Malagasy Zoos

Like many zoological institutions through Europe, the Malagasy zoos are currently closed for an indefinite period.

The Prosimian TAG has produced a poster on hygiene and protective measures against the COVID-19 aimed at the keepers in Malagasy zoos, in collaboration with Lemurs' Park, Vakona Lodge and the veterinarians Marie Simon from Thoiry Safari Park and Jérôme Catinaud from Lumigny Zoological Parks who both have been training local staff in Malagasy zoos on several occasions.

Additional posters that explain proper handwashing have also been distributed.



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The manifold impact of the corona pandemic on conservation in Madagascar is explained in an interview with Minister Vahinala Raharinirina: "COVID-19 will hurt Madagascar's conservation funding"

<https://tinyurl.com/yc6cqpxf>

