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ARTICLES

# Elephant tuberculosis as a reverse zoonosis

## Postcolonial scenes of compassion, conservation, and public health in Laos and France

Nicolas Lainé

## Abstract

In the last twenty years, a growing number of captive elephants have tested positive for tuberculosis (TB) in various institutions worldwide, causing public health concerns. This article discusses two localities where this concern has produced significant mobilizations to ask about the postcolonial resonances of this global response. The first case focuses on epidemiological studies of elephant TB in Laos launched by international organizations involved in conservation, and on the role of traditional elephant workers (mahouts) in the daily care for elephants. The second describes the finding by veterinarians of two elephants suspected of TB infection in a French zoo and the mobilization of animal rights activists against the euthanasia of the pachyderms. The article shows that while, in the recent past, in France elephants were considered markers of exoticism and in Laos as coworkers in the timber industry, they are now considered to be endangered subjects in need of care, compassion, and conservation. This analysis contributes to the anthropology of relations between humans and elephants through the study of a rare but fascinating zoonosis.

## Keywords

tuberculosis, reverse zoonosis, Laos, France, elephant

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## The re-emergence of a reverse zoonosis

During the last twenty years, the growing number of captive elephants that have tested positive for tuberculosis (TB) in various institutions worldwide has caused public health concerns. Globally, tuberculosis remains the second leading cause of human death after HIV, generating nearly 1.5 million deaths annually (WHO 2016). Elephant TB has been known since ancient times: a disease clearly similar to TB is found in Sanskrit documents dated more than two thousand years ago in India (Iyer 1937). After the death of two elephants in a US circus in 1996 and five more cases in a US elephant sanctuary the following year,[1] the United States Department of Agriculture (USDA) along with the American Association of Zoo Veterinarians joined efforts to produce 'Guidelines for the Control of Tuberculosis in Elephants' (USDA NTWGZW 1998).

In contrast with human TB, whose etiology was discovered in the 1920s and whose treatment was implemented in the 1940s, elephant TB has been investigated only in the last twenty years, mostly among captive individuals (Maslow and Mikota 2015). So far, among the confirmed cases, surveys have revealed a higher prevalence of TB in the Asian elephant species: between 1996 and 2010, out of the fifty-one reported cases, only five were African elephants, and until recently none of the surveys mentioned the presence of the bacterium in elephants' natural environment. In India, one of the latest surveys reports cases of TB in wild elephants (Zacharia et al. 2017). Since 2006, a major project, The Nepal Elephant Healthcare and TB Surveillance Program, has been conducted in Nepal at the national level, finding that 15 per cent of captive elephants tested positive for the bacterium (Mikota et al. 2015). Seven elephants carrying the pathogen died between 2002 and 2009.[2] As symptoms remain unclear (no coughing or sneezing), the only visibility of the disease is the correlation between seropositivity and later death.

An intriguing fact is that most cases of TB in elephants are correlated with the presence of *Mycobacterium tuberculosis*, the causative agent of the disease for humans. This suggests that the pathogen has been transmitted from humans to elephants, due to frequent and daily contact among visitors, vets, and caretakers, and the pachyderms in zoological parks and circuses. While initially elephant TB had been qualified as a 're-emergent disease' (since it was already mentioned in ancient times), more recently it has been considered a 'reverse zoonosis' (Shimshony 2008). The term suggests that, contrary to most zoonoses, for which public

[1] For a review of confirmed cases and the elephant TB outbreak in the United States in 1996 see Michalak et al. 1998.
[2] See the dedicated website of the programme: http://www.elephantcare.org/tbnepal.htm.

health concerns are focused on the transmission from animal reservoirs[3] to humans, elephant TB raises concerns about the conservation and health of elephants as it is affected by their new relations with humans. While viruses such as influenza virus A H5N1 ('bird flu') or Ebola become pathogenic among humans or domestic animals but circulate asymptomatically among wild animals, elephant TB seems to be equally pathogenic among humans and elephants, thus troubling relations between the wild and the domestic elephants.

Elephant TB is therefore an excellent case for an anthropology of zoonoses, one that is attentive to the entanglements of humans and animals (Brown and Kelly 2014). Observing relations among elephants, elephant workers, veterinarians, and conservationists provides an understanding of how zoonotic risk is framed and managed in a global arena of concern for emerging infectious diseases (Collier, Lakoff, and Rabinow 2004; Fortané and Keck 2015). The case of elephant TB is all the more interesting as TB is a slow-developing disease, in contrast with fast viruses such as Ebola or bird flu, and it takes even more time when it develops in animals with a long life expectancy, such as elephants. It thus leaves time for controversies to develop and for uncertainties to be handled by different actors interested in the conservation of elephants.

It still remains unclear, for instance, whether elephant TB is a real threat for elephants or is framed as a threat to foreground the environmental risks for other species.[4] Within the scientific community, this uncertainty produces debates about how to best control elephant TB. Should funds be directed to a few individuals, treating the positive cases while trying to develop a reliable screening test? Or should scientists monitor the elephant species at large in order to increase its chances of survival (Riddle, Miller, and Schmitt 2012)? These questions are not raised for zoonoses such as bird flu or Ebola, even if primates, bats, and wild birds are also protected species, because the zoonotic risk is framed as a transmission from the wild to the domestic, not the reverse.

These uncertainties produce diverse effects – care, compassion, and fear – in the global arena of elephant conservation. This set of various reactions seems to follow what the geographer Lorimer (2015) describes as 'affective logics'. Drawing from nonhuman

[3] 'Animal reservoir' refers to any species in which at least one pathogenic agent grows. For example, plague uses bat as a species reservoir that can infect many other species.

[4] In a 2006 survey, lesions typical of TB were found in the foot bones and ribs of more than half of 113 mastodon skeletons investigated, suggesting that TB may have contributed to the mastodon's demise (Rothschild and Laub 2006). However, many experts appeared to be sceptical regarding elephant TB and the potential risks. In 2011, the USDA held a seminar about TB in elephants entitled 'Tuberculosis in Elephants: Science, Myths, and Beyond!'

representations in wildlife films and their impact on producing support for species conservation, Lorimer (2015, 122) argues that affective logics constitute 'a particular embodied disposition that establishes a habituated set of practices and feelings, often occurring in advance of reflexive thought, through which a person orients himself or herself within, and makes sense of, an encounter with human and nonhuman others'. Such logics spur mobilizations and raise controversies, all the more as they deal with nonhuman animals that are considered simultaneously to be both victims and agents of disease transmission, with potential impacts on various levels (from individual to species to environmental).

Relying on multispecies studies (Kirksey and Helmreich 2010; Van Dooren, Kirksey, and Münster 2016), this article then asks how effects are framed in a context where humans and animals live together. It specifically borrows the ecosyndemics approach, which 'focuses attention on the continuous and consequential interactions that occur between biological, socio-political and environmental phenomena' (Singer 2014, 1302–03). Human-elephant relations have become a topic of lively anthropological interest, investigated in several parts of South and Southeast Asia (Locke and Buckingham 2016), even forming a subfield called 'ethnoelephantology' (Locke 2013). Lowe and Münster (2016) have recently addressed the entanglement of humans and elephants through the surveillance of herpes virus pathogens in three different institutions, going beyond a simpler story of dyadic human-elephant relations and including microbes in a multispecies ethnography, 'emphasizing the scope of their sociality and their engagements with other lively entities' (Lowe and Münster 2016, 119). Similarly, this article intends to produce a multisited and multispecies (elephant, human, and pathogen) approach to the global concern about elephant TB in two areas: Laos and France. Since Laos was a French protectorate under colonial rule in Indochina (Ivarsson 2008), the article suggests exploring this postcolonial framing to explain how concern about elephant TB shifts from the local to the global, engaging different values regarding elephants found in conservation, animal labour, tourism, and public health. I start with the campaign of TB surveillance in Laos and ask about its meaning for local workers, and then trace the mobilization of conservation biologists to a controversy surrounding two elephants suspected to be infected in a French zoological garden.

## An ethnography of elephant TB surveillance in Laos

Laos – known as 'the country with one million elephants' ('Lan Xang'), a label strongly promoted by France when it was the 'protector' of the king of Laos (Ivarsson 2008) – is at the heart of the zone where the global concern about elephant TB has focused, because elephants are still in contact with humans in this area of Southeast Asia. There are only between eight hundred and nine hundred elephants still living in the country today, and the number of captive elephants (estimated at 470 individuals) is higher than the number of wild

elephants. With an average of just three births versus fifteen deaths per year and less than sixty female elephants of breeding age left, the captive elephant population in Laos is declining rapidly. In Asia, elephants live either in the wild or in a domesticated state among humans, as in temples for religious purposes or in villages for economic reasons, where they are handled by specialists called 'mahouts'.

A number of recent studies have focused on the prevalence of TB among elephants and some on mahouts as transmitting the disease. A recent report from India mentions that diseases now kill more elephants than do poachers (Mohanty 2016). In South India, where temple elephants are in daily contact with humans, out of a sample of 179 captive elephants tested, a survey conducted as part of a broader project on captive elephant health running from 2002 showed a seropositivity rate of 18 per cent (Verma-Kumar et al. 2012). Since the results of that survey began to be broadcast by media, there has been a campaign to ban the blessing of elephants (in Hindu temples of South India, elephants use their trunks to bless devotees) from all temples in Tamil Nadu (Telegraph 2010). India's recent national plan to eradicate TB includes the possibility that elephants may be carrying the pathogen (Akbari 2017). Similarly, in Thailand, a preliminary survey based on clinical signs revealed for the first time the probable transmission of the bacteria from mahouts to elephants (Angkawanish et al. 2010). In Malaysia, a study conducted in 2012 found a seroprevalence rate of 20.4 per cent (out of sixty-three elephants tested), and 24.8 per cent among 149 elephant handlers tested (Ong et al. 2013).

In South and Southeast Asia, elephants were long used as coworkers in the logging industry during the colonial period. But by the end of the last century, national efforts to protect biodiversity led to the banning of such activities in several countries. That was the case in Thailand in 1989, as it was in India in 1996 when thousands of elephants lost their jobs and their owners lost their incomes (Lainé 2012). In Laos, mahouts have succeeded in continuing to practice their techniques thanks to the development of tourism camps where they teach tourists how to handle elephants. But the risk of transmission of elephant TB threatens this burgeoning economy.

In 2015, I conducted a study on mahouts' perceptions and treatment of elephants in Laos, in light of the risk of transmission of TB. My research assessed the impact of TB surveillance for the populations living and working with pachyderms in the country. I sought to describe the local perception of elephant TB among those specialists who coexist with them daily, the mahouts and the owners of animals, to understand how health and conservation issues could be linked to different forms of animal knowledge. Data collection was exclusively based on participant observation of mahout/elephant relationships and semidirected interviews with

mahouts. In addition, I compared the management and relations of distance and proximity with other animal species like buffalo.

My fieldwork site was in Sayabouli Province in the northwest part of Laos, where I stayed in tourist camps and in villages among the Tai Lao and the Tai Lue communities. The province currently hosts about three-quarters of the total domestic elephant population in Laos. In some districts, the seroprevalence rate of elephant TB was 54.6 per cent, as revealed by a survey assessing TB prevalence among captive elephants at the national level (Lassausaie et al. 2014). In the course of this survey, veterinarians applied serological tests to eighty-two elephants and visited 145 mahouts. With their agreement, the mahouts and the elephants' owners were driven to hospitals for clinical examinations and radiography, and if they demonstrated any clinical signs their sputum was cultured and tested. Ninety-nine of the 145 mahouts tested had clinical signs of TB, but, after culture tests, only one was effectively positive for TB. In its conclusion, the study did not assert a possible transmission of TB from elephants to their mahouts. But, considering the high TB prevalence in the country (WHO 2016), it strongly recommended the medical surveillance of humans and elephants.

As part of 'The Lao Elephant Management and Care Program', led by a French-based nongovernmental organization (NGO) called ElefantAsia and in collaboration with the National Animal Center and the Department of Livestock and Fisheries of Lao PDR, a veterinary mobile unit travels to each district where captive elephants and their mahouts live for a routine yearly visit, and systematically disseminates information about TB risk. In the country since 2001, ElefantAsia has concentrated its efforts on registering captive elephants, aiding in elephant reproduction, and providing veterinary medicine. Mahouts are asked if they have noticed in their elephant any specific TB signs: tiredness, loss of weight, loss of appetite, or abnormal and frequent trunk flow. Veterinarians also encourage mahouts to visit a hospital if they see any signs related to TB in themselves and to take an HIV test.

Out of the thirty-six interviews I conducted during four months of fieldwork,[5] all the mahouts were aware of human TB, as all of them were vaccinated against this disease during their childhood. Moreover, they were all informed about elephant TB as a potential risk because of the study mentioned above. Locals did not, however, call the disease 'TB' or 'tuberculosis' but used its Tai name: '*wan gna lok*'. Older persons used the term '*khi ut*', which literally means 'coughing with difficulty breathing'. Most of them didn't believe that TB was transmitted among elephants, humans, and buffaloes: as Lung Si, the owner of an elephant in Ban Phonxay village, declared to me during the fieldwork, '*xang bo dtît xang; xang bo dtît*

[5] Fieldwork was conducted between the months of September and December 2015.

*khon; xang bo dtît kwai*'[6] (there is no possible transmission between elephants, between elephants and humans, or between elephants and buffalo).

One of the places I stayed was the Elephant Conservation Center (ECC), a park and tourist centre founded by ElefantAsia that is largely owned and run by foreigners. There, mahouts had to sign a contract that instructed them to communicate in a certain manner when interacting with visitors, especially foreigners, and not use improper tools with animals. Mahouts should, for example, avoid the use of the *khor* (a long stick with an iron spine[7]) to control their elephant and the *khorbeit* (a sort of leash attached to the elephant's ears). For security reasons, mahouts were allowed to keep a traditional long knife (*dao*), a tool that is not specifically associated with elephants but is widely employed by Laotians for several purposes. This way, visitors would not worry whether such tools might be employed to control the animal. Mahouts were instructed to avoid shouting loudly and/or beating their elephant in front of tourists, and to behave with care, trust, and a sometimes corrective manner (Lainé 2016). Mahouts insisted they needed to use such tools because when an elephant is not listening and does not respond properly, if it is not corrected immediately, it will become uncontrollable when visitors are not there and when the elephant has returned to the village.

Western visitors' concerns about animal welfare thus guided the management of elephants at the ECC and other such tourism camps. When it was created in 2011, the ECC offered elephant trekking, but due to visitors' concerns and expectations it has ceased doing so. The current manager of ECC claims to practice 'ethical tourism' as a way to distinguish its centre from others in the country.[8] In June 2015, the centre became a member of the Asian Captive Elephant Working Group[9] (ACEWG), a regional conservation and welfare organization that aims at improving the quality of life of captive elephants across Southeast Asia. One of the first outcomes of the ACEWG meetings was the decision to discourage any participating camps from offering trekking with elephants.[10]

[6] Interview conducted on 26 May 2015.

[7] '*Khor*' corresponds to '*ankus*' in the Indian world from where it originates and then spread throughout South and Southeast Asia (see Trautmann 2015).

[8] The group has recently published a report regarding the welfare of elephants in tourist camps (see ASEAN 2015).

[9] This group was initially known as ASEAN *Captive Elephant Working Group*.

[10] Banning elephant trekking in the name of their welfare is something also observed in Thailand, which has also changed the way tourist camps are adapting to and communicating with visitors (see chapter 9 'Elephants in Tourism: Sustainable and Practical Approaches to Captive Elephant Welfare and Conservation in Thailand' in Malikhao 2017).

Western veterinary medicine was used with elephants working in tourist camps, but mahouts working in neighbouring villages were more reluctant to call and consult a vet, even though treatment would be provided free of charge through ElefantAsia. Some mahouts told me that veterinarians were the cause of most of the elephant's diseases. ElefantAsia supports a team of veterinarians, many of whom are French, to provide services as part of a voluntary contract. In order to gain trust among local mahouts and owners, the volunteer veterinarians provide free care to elephants as well as distribute 'elephant first aid kits' (Suter 2010). When I talked about medicine in the context of villages, rather than in camps, all mahouts strongly affirmed that elephants were able to cure themselves via self-medication by selecting plants and roots on their own. They took it as proof that camp locations did not provide a sufficient variety of food, leading camp elephants to get sick more frequently than those in villages.[11]

Similarly, while these vets examined elephants for external signs of TB, the meaning of those signs on the elephant's body was not the same for village mahouts. They said they were used to seeing their elephant get thinner and tired, but did not think this could be related to TB or any other disease. It was part of ordinary life, for them, to see an elephant changing shape, especially after four to five days of timber logging; but once they released the elephant into the forest, within one week or so, the animal easily regained weight and became healthy again.

Rather than discuss external signs of elephant health, mahouts talked about their relationships with invisible beings. Like all big animals, elephants are said to have spirits or *phi* (*'sat nyai mi phi'*). The presence of spirits in everyday life involves a ritualization of elephant and mahout everyday life as well, as observed in other human–elephant ethnographies, such as Lainé 2014 on the Tai-Khamti in northeast India. Past research on Laos religion describes the presence of mahouts and their elephants in ritual ceremonies. In the 1960s, at the time of the Kingdom of Laos, Archaimbault (1973, 1991) found that mahouts were considered exorcists because they were able to communicate with supernatural entities such as spirits, and thus took on important roles in performing rituals to protect the kingdom.

During my fieldwork, I observed that when a mahout left an elephant in the forest at night, he asked the spirit of the forest (the *phi pa*) and the spirit owner of the area (*chao don chao dee*) to take care of the animal and protect it from snakes and evil spirits (*phi phai*). Such daily

[11] Elephant owners make the same point to argue for continuing their work in forests instead of renting their elephants to tourist camps (see Lainé 2017b).

rituals implied that several specialists were needed to maintain a harmonious relationship for each interspecies community, as well as to assist in the health of the animal when needed.

At the village level, such specialists were called the '*mo xang*'. Elephant owners asked for their help during an elephant's training and throughout the life of the animal. *Mo xang* used magical words (*khata*) to cure elephants and could chase an evil spirit from an elephant's body. In Laos, such incantations to cure and/or to protect elephants were also witnessed by Archaimbault (1966) during the annual celebration of the construction of the Wat (pagoda) in Luang Prabang in the 1960s: all the king's elephants were called to the pagoda and the chief mahout whispered *khatas* in the animals' ears. A mahout he met during the ceremony informed him that the ritual was performed not only to protect the king but also to protect the king's elephants and their mahouts. In the present day, *mo xang* are also called when an elephant gets weak and does not respond to his mahouts. Every year in April, at the time of Lao year (*Pi Mai*), elephant owners call on *mo xang* to perform the *baci* ceremony for their animal to remain healthy.

Figure 1. A mahout praying to a forest divinity to ask for protection of his elephant before releasing him in the forest. Source: Lainé 2015

Unlike buffaloes and other livestock in Laos, village elephants are part of their owner's family. In most of the mahouts' households I visited, there were photos of elephants along with all the family members. Mahouts say that elephants are protected by the spirit of the house, the *phi huean*. They call upon this spirit deity when they go to work in the forest and seek its protection for both of them. In addition to their protective role, *phi huean* do important work in ensuring the well-being of the elephant and the general household. A mahout in Viengkeo village told me that he once had been unable to find his elephant in the forest for several days, but finally managed to get the elephant back. He said that the *phi huean* had hidden the animal, depriving the family of income, because he and his wife had been constantly fighting. Finally, after promising the *phi huean* that they would not fight anymore, he was able to find his elephant.

When an elephant dies, the *mo xang* have to separate the animal from the family. During a ceremony, the *mo xang* asks the *kwaan* (vital force) to leave the elephant's body, saying that he is no longer part of the mahout's family. After this ceremony has been performed, the owner of the animal decides if the elephant's body is to be burned, buried, or eaten (in this case some part of the elephant's body is used for medicine, especially the nails, ivory, and hair). During my fieldwork, eating elephant flesh appeared to be quite common among the Tai Lao population. Very few elephant owners were willing to kill their elephant if the animal was seriously sick or dying. I only heard one story of an elephant owner who decided to kill his animal because he was too dangerous, but when I asked whether one should kill a sick elephant I received a negative answer. Instead, owners told me that every effort should be made to save the animal, including using ritual and medical treatments.

At the village level, in addition to the ritual healing of the *mo xang*, other specialists, the *mo ya*, were called to care for elephant health. Such specialists used medicinal plants to cure humans as well as animals. For that, the *mo ya* refer to various compositions indicated on manuscripts written in Tai or in Pali, called *Tham la Ya*. There is no mention of elephant TB or any related disease in *Tham la Ya* or other such manuscripts, which reinforces the idea that it is a modern disease for the Tai Lao people.

Traditional medicine, although it is part of local surveillance and care, is often in conflict with modern veterinary standards. In the current surveillance campaign, only visible signs are taken into consideration by vets. However, I found that mahouts and owners are particularly attentive, in their daily interactions, to signs of sickness in their pachyderms. In a way, their attention constitutes another form of surveillance of animal health. This other form of surveillance may in fact be better for the conservation of the species, and for public health, because it identifies illness earlier. But according to mahouts and elephant owners, TB appears in the context of veterinarians' medicalization of elephant diseases.

In December 2015, a caravan of twenty elephants crossed the northern part of the country in forty-five days – a similar initiative had been launched in 2002 – and finished its route in Luang Prabang on the occasion of the twentieth anniversary celebration of the city as a UNESCO cultural heritage site. Establishing both elephant and mahout as essential aspects of Laotian heritage, the caravan promoted the local knowledge of mahouts, who wore royal costumes during the trek. Mahouts were asked not to talk about animal diseases, which steered conversation away from global health concerns and biodiversity conservation issues. Such an event, which brought together both local and global actors and concerns, could have been an opportunity to transform mahout knowledge into an effective tool for the prevention of animal disease outbreaks (Lainé 2017a).

In Laos, then, the global concern about elephant TB took shape within a context of national and international mobilization related to care and conservation. Since major efforts towards species conservation in the country were led by ElefantAsia, a French-based NGO, the response to elephant TB also draws on historical links between France and Laos, based in a particular form of colonization. In contradistinction with the British in Thailand, Burma, and India, during the colonial period, France did not exploit much of the logging potential of the current Laos, though doing so had been an integral part of its plan, as mentioned on several occasions by explorers such as Auguste Pavie (2006). The threat of invasion by other kingdoms prevented France from exploiting natural resources before declaring independence and forming the Lao People's Democratic Republic in 1949. Logging arose only after independence, becoming extensive after the 1975 revolution, when the government opened the market to foreign investors, mainly coming from neighbouring Thailand (Walker 1999). This led international NGOs such as ElefantAsia to engage in the conservation of the species in the early 2000s, which has continued through the present day (Lainé 2018). Interestingly, just as France pretended during colonial rule to be the protector of Laos, today a French-based NGO pretends to be the protector of the elephant. While it is not in the scope of this article to sketch out a form of ecological colonialism, there seems to be some continuity in the history of relationships between these two countries in the field of elephant conservation.

It is therefore interesting to trace a controversy that developed in France two years before concern grew about elephant TB in Laos to see how this zoonosis is perceived by the former colonial ruler. This controversy created a context in which ElefantAsia could more successfully direct attention to elephant TB. In Laos, French veterinarians worked with local mahouts, whose perceptions of elephants contrasted with theirs, while in France they had to work with animal rights activists.

## A controversy in a French zoological park

In 2010, the zoological park of La Tête-d'Or (the Golden Head) in Lyon *brought* two retired Asian elephants to Pinder Circus to serve as companions for an elderly female elephant, named Java, who was the only remaining elephant in the company. The same year, these two animals, named Baby and Nepal, tested positive for TB. As a precautionary measure, the animals were isolated and the zoo director sought clearance from legal authorities. The following year, the veterinary service from the Direction Départementale de Protection des Populations, a French public health department for animals, asked Pinder Circus to take their animals back. But Pinder Circus refused, stating that Baby and Nepal were in good health before coming to the zoo, and the director of the circus put the case on trial.

In 2012, Java died. Her postmortem examination revealed that she was infected with TB. After the initial controversies following their arrival at the zoo, there was not much doubt that Baby and Nepal had transmitted TB to Java. Rapidly, a prefectural order asked the Lyon city council, in charge of the zoo, to euthanize the elephants within thirty days. Animal rights activists allied with the zoo vet Florence Ollivet-Courtois to launch a campaign to save them, through petitions, demonstrations, and a book (Ollivet-Courtois 2015). Pinder Circus asked the French president to intervene and stop the euthanization of Baby and Nepal, with the agreement of the agricultural minister. Princess Stephanie of Monaco, a popular figure in France and former singer, proposed to take care of the elephants if they were not contagious. Thanks to the fortune of the royal family, she built a camp for them on a small hilltop in the south of France where visitors are able to see them. Before doing so, she announced in the French media that a second test revealed that Baby and Nepal were not infected with TB. The popularity of Baby and Nepal is still strong today in France, where an association was created to support the two, whose Facebook page is regularly updated.[12]

As observed by anthropologist Manceron (2012), animal rights activists in France tend to cast animals as individual subjects, creating trouble in identification and a double continuity between human and nonhuman animals, both in biological terms and concerning their interiority. It should be noted that contrary to environmental activists whose actions focus on species, animal rights activists are guided by an animal ethics perspective: working to improve the welfare of individual animals, or, in a more radical move, to liberate captive animals (Callicott 1998; Vilmer 2008). From the mahouts' perspective, acknowledging an elephant's individuality is based on knowing the habits of working and living with animals. In Western countries, the emphasis on the individuality of elephants is linked to the

[12] See http://www.association-baby-nepal.com/.

anthropomorphic marketing of circuses in which elephants are part of a tamed representation of wilderness (Nance 2013).

The suspicion of TB in Baby and Nepal led animal rights activists to question the presence of captive individuals in zoological parks and circuses. They argue that the state of captivity causes a stress that induces a decrease in an animal's immune defences, and thereby exposes them to pathogens absent in their natural environment (Mikota 2009). Moreover, they argue that if elephants can be infected by humans, elephants can also act as amplifiers of the disease and transmit it back to humans. The campaigns led by animal rights activists to protect Baby and Nepal were similar to the ones that occurred in Woodland Zoo Parks after the death of Hansa, the first insemination-born juvenile elephant (Lowe 2017). The 'happy ending' story of Baby and Nepal reveals a great deal about how the status of animals has changed in Western countries, from being objects of exoticism in nineteenth-century circuses and zoos to subjects of empathy in twenty-first-century wildlife reserves and natural shelters (Baratay and Hardouin-Fugier 2002; Lorimer 2015).

To write the story of Baby and Nepal from their perspective, however, it would be necessary to move beyond these effects of compassion and retrace the networks of care through which they have passed. Initially captured from India and bought by a German circus, they were later purchased by the French Pinder Circus, and were supposed to end their lives in the zoological garden in Lyon. Throughout their lives, both were included in circulation and multispecies networks. While they were declared seronegative for TB during the controversy, no one really knows whether Baby and Nepal brought TB from Asia at the time of their capture, or were infected while with their previous circus, where they used to travel with many other animals. Other animals in the zoo could have infected them, and maybe Java herself could have transmitted the disease, contrary to what the zoo authorities assumed. Culture testing, the most efficient tool for detecting human TB, is almost impossible to do with elephants, as it requires trunk-washing and training the animal, and takes six to eight weeks for confirmation. In addition, STAT-PAK, the only serological test available since 2007, is overly sensitive and many elephants appear to be positive when they are not actually carrying the germ.

These uncertainties concerning the transmission of the disease have been erased by the judicial quest for certainty that has opposed the state's authority with that of animal rights activists. Traumatized by the 'mad cow disease' crisis (Keck 2008), public health authorities have used the precautionary principle to avoid any potential transmission between elephants and humans, and threatened to kill elephants in order to protect humans. This principle requires the maximization of the risk of transmission of zoonotic pathogens and the minimization of the value of animal life in respect to the value of human life. But the Parc de

la Tête d'Or in Lyon is a free public zoo situated in the centre of a big city, where visitors have become familiar with the daily habits of elephants, whom they often know by their names. Animal rights activists, who often hold memories of visiting elephants in zoos, have portrayed elephants as subjects, insisting on their longevity and intelligence. Between these two opposite views of elephants, veterinarians such as Courtois-Ollivier had to defend epidemiological and serological knowledge while valorizing mahouts' relations with elephants.

Concern about elephant TB in Laos may have been amplified by the campaign to save Baby and Nepal in France. ElefantAsia seized on the global concern about TB as an opportunity to seek funds from international foundations in order to conduct the epidemiological analysis of elephants in the country. Funding from the International Elephant Foundation allowed ElefantAsia to buy a mobile veterinary care clinic (a special vehicle adapted for treating elephants), which is still in use in their visits to villages. Lassausaie, the French veterinarian in charge of sample collections and analysis in Laos, published an epidemiological study in 2014, two years after the mediatized scandal about the euthanasia of Baby and Nepal. ElefantAsia may have benefited from this moral atmosphere, which empowered them to warn against the potential extinction of pachyderms in 'the country of one million elephants' and the effect this would have on tourism to elephant camps.

## Conclusion

Global concern about elephant TB is taking place in the paradigm of emerging and re-emerging infectious diseases that has developed in the last thirty years (King 2002). It also finds echoes in a variety of contexts with different interests (heritage tourism, public health, species conservation), and zoonotic risks are variously perceived by the stakeholders involved. From animal rights activists to environmental activists, from zoo visitors to elephant keepers in Western countries, and from tourists visiting camps to mahouts and veterinarians in Asia, the issue of reverse zoonosis raises many questions related to public health and environmental conservation. The answers given to these questions in different contexts are themselves reversed, in the sense that they are problematized in ways that differ from classical zoonotic frameworks. The oppositions between wild and domestic, subject and object, reservoir and host are also reversed when elephants appear as a domestic species threatened by the massive arrival of tourists.

In Laos, my ethnographic research centred on mahouts and elephant specialists to understand how they may participate in the surveillance campaign. Their knowledge of elephant disease and of the invisible entities that contribute to the well-being of animals could be used to preserve elephants from disease, and, even if the risk of transmission is not

very high, they could play a sentinel role for other environmental threats. The success of surveillance is hampered by mahouts' difficulty in accepting there may be a zoonotic risk, as they view TB in animals as a new entity that is strongly associated with the arrival of Western medicine. In this context, not only does elephant tuberculosis make no sense to them but it seems that it exacerbates existing tensions by strongly opposing local and Western knowledge on pachyderms. TB surveillance among elephants gives veterinarians new legitimacy in the management and control of pachyderms in the country.

There is a striking continuity between the current elephant conservation efforts conducted in Laos and the role of the protector assumed by France during the colonial era. While that role aimed to protect kingdoms from invaders, it has shifted towards protecting wildlife, and elephants in particular. Since the beginning of the twenty-first century, ElefantAsia has led major efforts to protect elephants in the country, including recently creating the Elephant Conservation Center. In Lyon's zoological park, the risk of TB in elephants similarly revealed relations of proximities and distance created over time between human visitors and captive animals, and between animals themselves depending on whether they come from zoos or circuses. The decision that allowed Princess Stephanie to move Baby and Nepal to a private park, stipulating that there was no risk of transmission of TB from humans to elephants, seemed to echo the colonial relations between the French state and Laotian kings.

In both France and Laos, elephant TB as a reverse zoonosis has played a different role than other zoonoses. In France, the focus was trained on individual animals and the risks of spreading the pathogens to other animals in the zoo. In Laos, conservation objectives go beyond individual cases to reach the species at large. While in France elephants have turned from objects of exoticism into subjects of empathy, in Laos they have turned from coworkers in local communities to sentinels of a global threat. Elephant TB thus reveals the ambivalence of reverse zoonosis. Should the control of elephant TB lead to the protection of elephants from humans or humans from elephants? Anthropologists Lowe and Münster (2016, 119–20) remind us that 'neither human care, love, and attentiveness nor techniques of control and creative management are sufficient to fully secure elephant survival'. While the number of elephants worldwide decreases, the number of contacts and interactions between humans and these animals continues to increase, whether in forests, in tourist camps, or in zoos. Elephant TB as a reverse zoonosis thus challenges the idea of a traditional stable ecosystem where humans and animals coevolve with the pathogens that they share.

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## About the author

Nicolas Lainé holds a PhD in ethnology from Paris-West Nanterre University (2014). He is currently affiliated to the Laboratoire d'Anthropologie Sociale (Collège de France, Paris) and teaches ethnozoology at Strasbourg University. His research lies at the crossroads of the anthropology of nature and conservation. He has published several articles on human/elephant interspecies community in South and Southeast Asia, and has coedited the collective volume *Nature, Environment and Society* (Orient Blackswan, 2012). He is currently pursuing his research interest in the issues of health and environment, and the link between biodiversity and cultural diversity.

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