Social representations of pathogens at the borders between species

A « One Health » perspective

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- 70% of emerging infectious diseases are zoonoses
- Pathogens mutate in animal reservoirs and cross species barriers before spreading between humans
- Global health initiatives aim at anticipating the emergence of zoonotic pathogens before they become epidemic
- Social anthropology can assess the role of human behaviour in these spillover events
- F. Keck et C. Lynteris, « Anthropology of Zoonoses », *Medicine Anthropology Theory* 5(3) <u>http://medanthrotheory.org/issue/vol-5-3/</u>



Gortazar C, Reperant LA, Kuiken T, et al. « Crossing the Interspecies Barrier: Opening the Door to Zoonotic Pathogens. » *PLoS Pathogens*. 2014;10(6) : 1-5.

Influenza virus transmission dynamics





Questions for a social anthropology of zoonoses

- How does the management of zoonoses reveal and transform relations between humans and animals ?
- Are local knowledges of animals obstacles or assets in the control of zoonoses ?
- How can early warning signals of diseases be perceived at the interface between humans and animals?

Avian influenza reveals contrasting perceptions of birds

Wild birds Domestic poultry Retailers Farmers Food industry Bird Watchers Microbiologists Veterinarians Physicians

Agriculture DeptMediaConsumersHealth DepartmentReligious Authorities

Birds as living beings



Birds as commodities

Birds as commodities







Birds as living beings

fangsheng







Comparison of the perception of zoonoses in different societies

- How do humans living with animals conceive zoonotic pathogens ?
- How do they control borders between wild and domestic animals ?
- How do they manage the bodies of sick animals ?

	Same interiority	Different interiority
Same physicality	Totemism (Australia)	Naturalism (Europe)
Different physicality	Animism (Mongolia)	Analogism (Southeast Asia)

P. Descola, *Beyond Nature and Culture*, The University of Chicago Press, 2013

Hendra virus in Australia



- First case in 1994 in Hendra (Brisbane)
- 89 lethal cases among horses
- 4 lethal cases out of 7 infections among humans

Why bats are good reservoirs for pathogens

- Species diversity (1116 species)
- Cohabitation of diverse species in roosting habitats
- Behavior changes due to human action (deforestation, bushmeat)
- Mammal immune system adapted to flight
- High longevity (30 years)



Aboriginal perception of bats



Cave art, Quinkan, Cape York

Purification ceremony, Wujal Wujal, Daintree Forest



Brucellosis and anthrax in Mongolia

- Mongolia is a post-Communist country with 46 million animals and 3 million humans
- A third of its economic production comes from herding cattle
- Brucellosis is a slow endemic invisible zoonosis, causing abortions
 - \rightarrow vaccination and prevention campaigns





• Anthrax is a fast visible zoonosis, causing death (108 human casualties in ten years)

 \rightarrow quarantine and culling

• Analogy with Foot and Mouth Disease, which causes massive cullings regularly



Ordinary slaughter : no blood spilled on the ground



Perception of animal diseases by herders

- Humans have bodies and souls (*süns*), animals have vital breath (*am*')
- Emerging animal diseases may come from wild reservoirs (gazelles)
- The bones of animals contain human souls, so they should not be broken or thrown away.
- Infected carcasses burnt or buried are considered inauspicious.

Elephant TB in Laos

- 1996: Awareness of the zoonotic potential of elephant tuberculosis after the death of 2 elephants in a US circus.
- 2011: in Thailand, a preliminary survey based on clinical signs revealed for the first time the probable transmission of the bacteria from infected elephants to mahouts.
- 2012 : a study in Laos shows the TB prevalence rate is 34% among elephants



MO



Laos : the « country with one million elephants »

- 800 to 900 elephants
- More than half of them are captive
- After official banning of their use in logging, they are displayed in tourism camps

Perception of elephant diseases by mahouts



- All big animals have spirits (*phi*)
- Attention to animal spirits is learnt when elephants are captured in the wild
- The health of elephants is measured on their size
- Although mahouts know about human TB, they deny it can be transmitted from elephants, and refuse the killing of suspected elephants

MERS-CoV in Qatar

- New coronavirus emerging in the Saudi Peninsula in 2012
- More than 300 persons infected, 30% have died
- Camels have been found positive to MERS-CoV from the Sahel to Central Asia
- No bats found with MERS-CoV. What is the animal reservoir ?
- Why has MERS-CoV emerged in the Saudi Peninsula and not elsewhere ?

Free camel milk distributions



Owners and workers are not the only ones to drink camel milk . Small barns in the city, in some neighborhoods, distribute free milk at milking time.

Camel market



Camel races



Can animals transmit diseases to humans ?



Conclusion

- Pathogens emerge among many invisible entities perceived by people living with domestic animals
- Zoonoses reveal the uncertainties of living with animals coming from wild environments
- Global health interventions make sense in local environments, raising concerns of conservation and sustainability

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