



Salga antelope horns. Photo: Hartmut Jungius

MEDICINAL ANIMALS AND ASIA

FAUNAL MEDICALIZATION IN AN ERA
OF MASS EXTINCTION AND ZOO NOTIC DISEASE

11-12 MAY 2023

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Anged pangolin in Indonesia. Photo: Getty Images

This workshop is part of the project “History and Sustainability of Animal-Based Drugs in Asian Traditional Medicines” funded by a Tier 2 grant from the Singapore Ministry of Education.

Animal parts and tissues have been used traditionally around the world as medicines as well as foods. Yet the incorporation of animals into medical systems based largely on plants is a historical process we still know comparatively little about, even in Asia, where the practice has been widespread. In the present day, most “medicinal animals” are in crisis, the subject of illegal and legal wildlife trading, driving many to the brink of extinction. The process of “faunal medicalization” has also been implicated in the spread of zoonotic disease, even while being promoted in some quarters as a cure. Understanding the historical and contemporary forces that have brought us to this juncture is the subject of this conference. We particularly focus on Asia as both a site and a global influence. As a *site*, certain Asian “traditional” medicines have transformed into “Asian industrial medicines”, with animal parts and tissues becoming raw materials for a growing pharmaceuticalization of traditional zotherapies. As an *influence*, Asian-centered animal trading networks now have global reach and are likely affecting or intermingling with pharmaceuticals and zotherapies in other parts of the world. We are thus open to accepting papers that address cases in Asia, or cases elsewhere in the world with strong connections to Asia or Asian cultures. We are particularly looking for papers that are historically-informed, but help to understand and contextualize the current crisis; that work against anthropocentric bias by valuing animal survival and health in its own right; that highlight connections or disruptions in use or scale between pre-modern and modern uses of animals as medicines; that discuss how Asian faunal medicalization practices have affected species and practices across or outside Asian nation-states; and/or that explore junctions between wildlife conservation, animal medicines, and consumerism.

CONVENORS

Dr Liz P.Y. Chee | Senior Research Fellow Asia Research Institute, NUS

Dr Kathryn Lynn Muyskens | Research Fellow, Asia Research Institute, NUS

A/P Gregory K. Clancey | Associate Professor, Asia Research Institute and Department of History, NUS

PROGRAM AT-A-GLANCE

DATE	TIME (SG)	PANEL SESSION
11 May 2023 (Thu)	09:45 – 10:00	WELCOME & INTRODUCTORY REMARKS
	10:00 – 11:15	PANEL 1
	11:45 – 13:00	PANEL 2
	14:00 – 15:15	PANEL 3
12 May 2023 (Fri)	09:30 – 10:45	PANEL 4
	11:15 – 12:30	PANEL 5
	13:30 – 14:45	PANEL 6
	15:15 – 16:30	PANEL 7
	16:30 – 17:30	CONCLUDING REMARKS

11 MAY 2023 • THURSDAY

09:45 – 10:00	WELCOME & INTRODUCTORY REMARKS Gregory K. Clancey <i>National University of Singapore</i> Liz P.Y. Chee <i>National University of Singapore</i>
10:00 – 11:15	PANEL 1 <i>Chairperson</i> Gregory K. Clancey <i>National University of Singapore</i> Drinking Antelopes: The Medicalization and De-Medicalization of Saiga Antelope Horns in China and Southeast Asia Liz P.Y. Chee <i>National University of Singapore</i> <i>Ejiao</i> , the Black-headed Shandong Donkey, and the Rise of Animal Medicines in China: A Case Study Natalie Köhle <i>University of Sydney</i>
11:15 – 11:45	TEA BREAK
11:45 – 13:00	PANEL 2 <i>Chairperson</i> Kathryn Lynn Muyskens <i>National University of Singapore</i> A Historical Survey of Snakes for Medicinal Use in Chinese <i>Materia Medica</i> Che-chia Chang <i>Academia Sinica</i> Meat as Modern Medicine in Middle-Class India Johan Fischer <i>Roskilde University</i>
13:00 – 14:00	LUNCH BREAK
14:00 – 15:15	PANEL 3 <i>Chairperson</i> Jason Ng <i>National University of Singapore</i> Medicalized Invertebrates: Damage, and Potential Damage, to the Backbone of Ecosystems Worldwide C. Michele Thompson <i>Southern Connecticut State University</i> A Case of Faunal De-Medicalization? Animal Medicines in Contemporary Sowa Rigpa Pharmaceutical Practice Stephan Kloos <i>Austrian Academy of Sciences</i>
15:15	END OF DAY 1

12 MAY 2023 • FRIDAY

09:30 – 10:45	PANEL 4
<i>Chairperson</i>	C. Michele Thompson <i>Southern Connecticut State University</i>
	Between Scarcity and Need for Medicine: Islamic Perspective on the Practice of Selling <i>Piyang</i> Fish
	Bibi Suprianto <i>Universitas Gadjah Mada</i>
	Rethinking Human-Animal Relations: The Use of Animals in Healing Rituals in Indigenous Communities in South Sulawesi, Indonesia
	Andi Alfian <i>Universitas Gadjah Mada</i>
10:45 – 11:15	TEA BREAK
11:15 – 12:30	PANEL 5
<i>Chairperson</i>	L. Roman Carrasco <i>National University of Singapore</i>
	Conserving Saiga Antelope by Managing Demand for Horn: Singapore as a Case-Study
	Diogo Veríssimo <i>University of Oxford</i>
	Hotspots of Zoonotic Disease Risk from Wildlife Hunting and Trade in the Tropics
	Jacqueline Wun Pin Choo <i>National University of Singapore</i>
12:30 – 13:30	LUNCH BREAK
13:30 – 14:45	PANEL 6
<i>Chairperson</i>	Liz P.Y. Chee <i>National University of Singapore</i>
	Polyglot Asian Medicine
	Michael Stanley-Baker <i>Nanyang Technological University</i>
	Traditionality and Animal-Based Drugs: A Database Project
	Gregory Clancey, Liz P. Y. Chee, Jason Ng & Hao Pei Chu <i>National University of Singapore</i>
14:45 – 15:15	TEA BREAK
15:15 – 16:30	PANEL 7
<i>Chairperson</i>	Stefan Huebner <i>National University of Singapore</i>
	Turning a Tiger into a 'Tea Pill': Accounting for Ethical Externalities in the Medicalization of Animal Bodies
	Kathryn Lynn Muyskens <i>National University of Singapore</i>
<i>Online</i>	Zootherapy Seen through the Lens of Museums of Traditional Medicine
	Katarzyna Jarosz <i>International University of Logistics and Transport</i>
16:30 – 17:30	SUMMARY & CLOSING REMARKS
	Liz P.Y. Chee <i>National University of Singapore</i>
	Gregory K. Clancey <i>National University of Singapore</i>
	Kathryn Muyskens <i>National University of Singapore</i>
17:30	END OF WORKSHOP

Drinking Antelopes: The Medicalization and De-Medicalization of Saiga Antelope Horns in China and Southeast Asia

Liz P.Y. Chee

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The Saiga Antelope population in Central Asia has been decimated in the last half-century due to over-hunting for its horns, which are widely used as medicine in China and the Chinese diaspora. According to the World Wide Fund for Nature (WWF), the steepest decline took place in the early 1990s when the fall of the Soviet Union resulted in a lapse in surveillance, and hunting of the species became widespread. Since then, efforts to conserve the animals have led to extensive research and investigation work by NGOs and conservation scientists. Attempts have also been made to shift consumer behaviour in Singapore and Malaysia since these countries have been identified as key importers of Saiga horns, legally and illegally [Doughty et al, 2019; 2021]. Missing in this literature, however, is a deeper historical perspective on Saiga horn's marketing and use. Originally treated strictly as a drug, the marketing of Saiga horn as a 'cooling drink' in late 20th century Singapore has made it a mass-consumption 'health product' only tenuously connected to traditional medicine. This paper thus traces the process of medicalization and what I'll argue is a *partial de-medicalization* of Saiga horn to show the different ways the animal has been consumed across two regions (East and Southeast Asia) in modern times.

Liz P.Y. Chee is Senior Research Fellow in the Science, Technology, and Society (STS) Cluster at the Asia Research Institute (ARI) and a Lecturer at Tembusu College, both at the National University of Singapore (NUS). She was the first graduate of the Edinburgh University-NUS Joint PhD Program (History/STS) and holds an MA in History and a BA (Honors) in Japanese Studies from NUS. Her monograph *Mao's Bestiary: Medicinal Animals and Modern China* was published in 2021 by Duke University Press, and her work has appeared in such journals as *Urban Studies* and *Science, Technology and Society*. Her research centers on the history of medicine and pharmaceuticals in modern China, and particularly the medicalization of animals. As Co-PI on the grant "History and Sustainability of Animal-Based Drugs in Asian Traditional Medicines", she will be helping to lead a large team of researchers over the next three years to historicize zootherapies in East and Southeast Asia, and understand their relation to the wildlife trade and zoonotic disease, among other elements of human/animal interaction.

***Ejiao*, the Black-headed Shandong Donkey, and the Rise of Animal Medicines in China: A Case Study**

Natalie Köhle

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Donkey hide gelatine (*ejiao* 阿膠) has been part of the Chinese apothecary for almost 2,000 years. Historically its production was limited. It was a regional specialty from Shandong province, whose potency was thought to depend on the use of skins from a particular breed of donkey (the Black-headed Shandong donkey 烏頭驢) and the water from a particular well (the E well 阿井 in East E 東阿, Shandong province). But in China's recent age of prosperity, *ejiao* has experienced exponential growth in demand and production. This has led to a severe shortage of donkeys in China and to a booming import market of donkey skins from the Global South. Bluntly put, almost the entire global donkey population risks being shipped to a remote Chinese province and turned into medicinal jelly within the next decade or two. Once a matter of small herds and artisanal workshops, the currently unfolding story of *ejiao* instantiates the way which the ever-growing demand for animal-based drugs in traditional Chinese medicine (TCM) poses an urgent threat to global biodiversity and the environment.

What are the factors that are causing the contemporary surge in the demand and production of animal consumption in Chinese medicine? Based on a case study of donkey hide gelatin, I contend that the current demand cannot sufficiently be explained by recourse to contemporary phenomena, even as it is situated in contemporary geopolitical developments, technologies, and pharmaceutical marketing campaigns. *Ejiao* continues to derive its legitimacy from age-old discourses, some of which centre on the power of animal-based medicines and on the efficacy of regional (*daodi* 道地) medicinal ingredients, such as the skins of the Shandong donkey.

My paper will undertake a study of the formation and development of these discourses, based on a comprehensive case study of the literature on *ejiao* and the Black-headed Shandong donkey in the *materia medica* (*bencao* 本草) literature from the earliest entry in the *Shennong_bencao_jing* 神農本草經 (c. 250–200 CE) through to entries in Republican period (1912–1949) pharmacopoeia. Based on this historical study, my paper will then elucidate the refractions of these historical discourses in the contemporary period (based on an analysis of contemporary stakeholder publications and promotional materials). In this way, the paper will aim to offer a case study of the historical processes that led to the incorporation of animal parts into Chinese *materia medica*, and it will aim to shed light on some of the factors that contribute to the rising demand for medicinal animals in contemporary China.

Natalie Köhle is a lecturer in History and Philosophy of Science at Sydney University who works on the history of Chinese medicine, with comparative interests in the history of Indian and medieval Greco-Islamic medical traditions. She works on two book projects: one on the *longue durée* history of Donkey Hide Gelatin (*ejiao* 阿膠), and one on the global history of Chinese phlegm. Natalie received her PhD from the Department of East Asian Languages and Civilizations, Harvard University and held previous appointments at the Australian National University and Hong Kong Baptist University. Her publications include an experimental edited volume, *Fluid Matter(s): A Cross-cultural Examination of the Imagination of the Humoral Body*, which explores the use of interactive, image-based storytelling for academic communication.

A Historical Survey of Snakes for Medicinal Use in Chinese *Materia Medica*

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East Asia has a long history of using snakes for medicinal purposes. The earliest written records date back to the third century BC. The ancient manuscript *Fifty-two Recipes for Ailments* buried in the tomb of the Han Dynasty records the prescription for burning snakes into black charcoal and eating them. The book does not explain the pharmacology, which may be the use of ancient witchcraft. In the 16th century, Chinese people's knowledge about snakes greatly expanded. The important classic "Compendium of *Materia Medica*" (1596) for the first time identified snakes as a separate category, enumerating 17 species and about 80 prescriptions. The author Li Shizhen (1518-1593) was able to use the theory of Chinese medicine to explain some of the properties and medicinal effects. On the other hand, he pointed out that various ethnic minorities living in the south like to eat snakes very much, and they are quite familiar with the medicinal properties of snakes. The Chinese people's travel experience in the south has become an important source of knowledge about snakes in the book "Compendium of *Materia Medica*". Today, snake meat is still popular in Fujian, Guangdong, Yunnan, Vietnam, Taiwan and other regions. Even in Japan, some people believe that taking snake gallbladder has the effect of strengthening and nourishing, and it has become the main ingredient of the well-known herbal liqueur "*Yomeishu*". The sale of snakes occupies a place in the international market. This book attempts to start with Chinese historical materials, including *materia medica*, jottings, local chronicles of provinces in South China, and travel notes, etc., to explore how many of the reasons come from the orthodox theory of Chinese medicine, and how much comes from the folk beliefs of various ethnic groups, so as to explore the food The historical origin of the custom of snake meat.

Che-chia Chang is an Associate Research Fellow at the Institute of Modern History, Academia Sinica. He obtained his PhD degree from Department of Asian and Middle Eastern Studies, University of Pennsylvania. He has been a Visiting scholar at the International Research Center for Japanese Studies, the Harvard-Yenching Institute, IKGf, Universität Erlangen-Nürnberg and so on. His major field is medical history in East Asia, particularly on the cultural interactions among areas or countries. He won the Zhu Kezhen Award in 2008 (from the International Society for History of Science, Technology, and Medicine) for his studies of the rhubarb trade between China, and the Islamic and European worlds. He continues his studies of medical history and has taught courses on the history of traditional medicine of China and Japan. He is now involved in projects on Jesuits' translating Western medicine into the Manchu language for the Kangxi Emperor's references. He is also Deputy Chairman of the Academia Sinica Center for Digital Humanities.

Meat as Modern Medicine in Middle-Class India

Johan Fischer

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Based on my book *Vegetarianism, Meat and Modernity in India* (Fischer 2023), this paper explores increasing meat production and consumption in India. The reasons for the popularity of meat, and the ways in which meat is produced and consumed, among the growing middle-class groups of India are not well understood. The central research question concerns why and how the emerging middle class are becoming overwhelmingly non-vegetarian at a time when the global focus on sustainability is more prominent than ever before. My findings show that health/nutrition-related beliefs increasingly inform medicinal systems entangled with meat modernity that signifies health; nutrition; and urbanized, individualized, and flexible lifestyles in the era of industrialized mass production. I argue that meat consumption and non-vegetarianism are conditioned by, and themselves condition, meat modernity. In the context of health and spirituality, my study shows that meat is regarded as having therapeutic or medicinal value and also that vegetarians are sometimes advised to eat meat by their doctors. Meat-eating is not only recommended by doctors: meat is often promoted as exactly healthy and nutritious in the many hypermarkets (a combined supermarket and department store that carries a large range of products) that have opened in urban India over the last decades. These hypermarkets signify a form of meat modernity that evokes middle-class lifestyles in the era of industrialized mass production. Meat is often considered a healthy remedy in the context of urban environmental challenges. 'Health' was used to reference Western scientific ideas about nutrition more often than concepts of spiritual or ritual pollution and purity. Based on quantitative and qualitative fieldwork in India, this paper provides a nuanced picture of meat consumption that can only be understood when explored in the context of wider economic, political, and social factors. By empirically studying the complex and changing patterns of meat-eating among the urban middle-class in India, this study contributes to an understanding of why and how dietary trends in the Global South are shifting towards meat-eating.

Johan Fischer is an Associate Professor in the Department of Social Sciences and Business, Roskilde University, Denmark. His work focuses on human values and markets. More specifically, he explores the interfaces between class, consumption, market relations, religion and the state in a globalized world. A central focus in this research is the theoretical and empirical focus on the globalization of moral economies. He is Editor of the Routledge book series *Material Religion and Spirituality* and on the Editorial Boards of *International Journal of Asia Pacific Studies*, *Research in Globalization* and *Contemporary Islam*. Currently, he works on a research project on veg(etari)anism and green economies in a global perspective.

Medicalized Invertebrates: Damage, and Potential Damage, to the Backbone of Ecosystems Worldwide

C. Michele Thompson

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When most people think of the use of animals in traditional systems of medicine, what springs to mind is one kind or another of megafauna such as rhinoceros, bears, sharks and others. Sometimes more mundane creatures such as pangolins are included. However, invertebrates and products from invertebrates have been used in Asian systems of medicine since the earliest records of *materia medica* from the region were created. Animals used range from shellfish and crustaceans, to turtles and tortoises, to various insects and insect products such as cocoons, honey, and beeswax. In terms of their role in the food chain, and their role as pollinators, invertebrates are as crucial to the health, indeed the survival, of ecosystems in Asia and elsewhere as the megafauna at the top of said food chains. While loss and degradation of habitat is probably affecting more invertebrates than medicalization, still, the expansion of medicalization in Asia and beyond is contributing to the danger many populations of invertebrates currently face. This paper will give an overview of the "categories" for invertebrates in Vietnamese Traditional Medicine and will then move on to a case study of two varieties of honey, and beeswax, producing bees found in northern Mainland Southeast Asia and southern China: *Apis dorsata* F. and *Apis cerana*.

Honey and beeswax have been items of local, regional, and international trade in Southeast Asia throughout recorded history. Historically the gathering of honey and beeswax has been done by indigenous minorities, from the mountains of the mainland and the interior areas of the larger islands of Southeast Asia. Northern Vietnam provides an interesting case study of an interface between the ethnic majority Vietnamese and indigenous minorities facilitated through the trade in honey and beeswax and their use in traditional systems of medicine. *Apis cerana* recently made the New York Times as a "tool using" insect. However, the 'scientific' researchers involved did not name any of the 'Vietnamese' farmers who pointed this tool use out to them. Given where this research was conducted, these 'farmers' were almost certainly members of a minority group rather than ethnic Vietnamese. An overview of interspecies interactions between *Apis dorsata* F. and *Apis cerana* and the peoples of Vietnam will provide background on why these communities know these bees well enough to point out their habits to the western scientists who failed to give them due credit. Both of these species of bees are in all probability important pollinators across their range. That I can only say that they are "probably" important pollinators indicates how little research on them has been done. Recent decades have seen an increase in popularity of foods and supplements perceived as 'healthy' and a demand that these be produced from the 'wild.' Honey and beeswax are two such products and this demand is putting pressure on wild bee populations with unknown future consequences for the plants that they pollinate.

C. Michele Thompson holds an MA in East Asian History and a PhD in Southeast Asian History, she specializes in history of medicine and science in Southeast Asia, she is a Professor of Southeast Asian History at Southern Connecticut State University. She is the author of numerous articles on the History of Medicine, Science, and the Environment in Southeast Asia. She is the co-editor of several edited volumes and special editions including *Translating the Body: Medical Education in Southeast Asia* and is the author of *Vietnamese Traditional Medicine: A Social History*.

A Case of Faunal De-Medicalization? Animal Medicines in Contemporary Sowa Rigpa Pharmaceutical Practice

Stephan Kloos

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One of the fundamental principles of Tibetan pharmacology is that all substances – correctly understood and used – have medicinal properties. This includes animal parts and products, which – like in other Asian medical traditions – constitute an integral part of Sowa Rigpa’s classical pharmacopoeia. But what about their use in contemporary Tibetan medical/pharmacological practice? How have pharmacological practices – most notably regarding animal products – been shaped by the transformations of Sowa Rigpa during the 20th century and its more recent industrialization? Based on over 20 years of ethnographic and textual materials as well as a review of the scant existing scholarly literature, this paper will argue that we can observe a partial faunal de-medicalization in Sowa Rigpa. This stands in sharp contrast to the Chinese context, where the industrialization of TCM coincided with a dramatic medicalization of all kinds of animals (Chee 2021).

After providing a broad overview of faunal medicines in Sowa Rigpa and its unique historical context, I will explore the different political, economic, and environmental factors in Tibetan and Himalayan societies that have prevented the incorporation of new animals into “traditional” pharmacopoeias, and even led to the substitution of classical animal ingredients with herbal ones. Even so, animals continue to be used in Sowa Rigpa, not only as pharmaceutical ingredients but also as fluid markers of ethics, efficacy, and cultural identity. As such, besides their medical – and a negligible symbolic – role, they also fulfill a sociocultural, political, and economic function that has hardly been considered before. In a broader context of globalization, zoonotic disease, and mass extinction, Sowa Rigpa’s uses of, and discourses around, medicinal animals provide important insights into the dynamics that differentially shape and inform Asian medical industries.

Stephan Kloos is the Acting Director of the Institute for Social Anthropology at the Austrian Academy of Sciences. He has worked for over 20 years on the larger role and development of Sowa Rigpa in India, China, and more recently also Mongolia and Buryatia. His work has been published in leading journals like *Current Anthropology*, *Social Science and Medicine*, and *Medical Anthropology*, and he is the co-editor of two books, *Healing at the Periphery* (Duke University Press 2022) and *Asian Medical Industries* (Routledge 2022).

Between Scarcity and Need for Medicine: Islam Perspective in the Practice of Selling *Piyang* Fish

Bibi Suprianto

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Piyang is an exotic freshwater fish living in Indonesia, which belongs to the species *Channa Striata*. It is used both as a medicine and a commodity to improve the regional economy in certain areas. Far from that, however, the *piyang* fish is also indispensable in riverine ecosystems. The practice of buying and selling *piyang* contributes to the scarcity of exotic freshwater fish species in river waters. This study intends to look at religious views in the practice of buying and selling *Pinyang* fish in Indonesia, and answers research questions such as: how does Islam view the practice?; what is the impact on natural ecosystems?; and does Islam prohibit the practice of buying and selling *Piyang* fish between the scarcity factor and the need for medicine? This study uses library research and information culled from social media. The results of this study indicate that religious views in the practice of selling *pinfish* illustrate: (1) there is a decision from Islam regarding emergency needs; (2) there is a health need that has an impact on fish scarcity; (3) Islam sees natural ecosystem systems affected by the practice of trading in *Piyang* fish. By understanding the role of religious views in the practice of buying and selling *Piyang* Fish, we can better know the impact of fish and human life between scarcity and health needs.

Bibi Suprianto is a student of the Center for Religious and Cross-cultural Studies (CRCS) at Universitas Gadjah Mada (UGM), Yogyakarta. He is active in publishing articles in several journals in Indonesia on such topics as Islamic Studies and Islamic Malay Traditions. He is presently working on several articles concerning religious speech, human-nature relations in Malay Tradition, and Islamic Moderation. He is also preparing his thesis in the postgraduate program at CRCS of UGM.

Rethinking Human-Animal Relations: The Use of Animals in Healing Rituals in Indigenous Communities in South Sulawesi, Indonesia

Andi Alfian

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Many indigenous communities in South Sulawesi, Indonesia, use animals in healing rituals, but in various ways. Some indigenous communities sacrifice animals in a series of rituals to cure disease, such as in the Cindakko indigenous community. Some others perform disease curing rituals by releasing certain types of animals into the forest, as in the Bara indigenous community. There are still other indigenous communities who believe that because humans and animals are siblings, they will get sick if they hurt animals, as in the Tobalo indigenous community. By using the Bara, Cindakko, and Tobalo indigenous peoples as cases, this paper aims to (1) understand what disease or illness means from the perspective of indigenous peoples; (2) interpret the meaning of animals as medicine or healing mediums in that context; (3) and rethink human-animal relations in the context of a moral and environmental crisis. In addition to collecting data using ethnographic methods (observation, interviews, and involved participation) for three months among the Bara and Cindakko indigenous peoples, I also employed a literature study to further understand the Tobalo indigenous community. To this end, the paper argues that the ways indigenous peoples in Indonesia, especially in South Sulawesi, treat animals, based on “inter-subjectivity”, can be used to decolonize human-animal relations, including in medicine and healing, which tends to exploit animals solely as objects.

Andi Alfian is a master’s student at the Center for Religious and Cross-Cultural Studies (CRCS), Graduate School, Gadjah Mada University, Indonesia. He is currently conducting research on “Building Inclusive Citizenship Based on Indigenous Knowledge” in indigenous communities in Indonesia. His research interests are indigenous philosophies, indigenous religions, and religion and development.

Conserving Saiga Antelope by Managing Demand for Horn: Singapore as a Case-Study

Diogo Veríssimo

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Poaching pressure for the international trade of wildlife products presents a substantial threat to biodiversity. The horn of the saiga antelope (*Saiga tatarica*) are used in traditional Chinese medicine (TCM) to treat fever and 'heatiness', a condition characterised by symptoms like a cough and sore throat. Using saiga horn consumption in Singapore as a case study, we investigated how an online consumer intervention could help reduce demand for a wildlife product with important sustainability implications. We identified middle-aged Chinese Singaporean women as primary consumers of saiga products. When consolidated with research and theory from different social science fields, a comprehensive understanding of this audience's behaviour was developed to identify behavioural insights that could be used to design a behavioural change intervention. The campaign was designed to align with the audience's perception that Singaporeans should be health-conscious and environmentally responsible consumers and utilised trusted sources of health information to help digitally spread the conservation message designed to limit saiga consumption. The impact evaluation revealed that the campaign message effectively altered demand for saiga products, however, there was variation between high-fidelity and low-fidelity consumers. We then look into the emerging research themes at the intersection of wildlife trade and saiga conservation: 1) It is currently unclear how different consumers groups consider the substitutability of different saiga products. This is key if we are to manage demand for saiga products. 2) There is very limited understanding of consumer preferences for saiga products outside Singapore, and countries like China, Japan and Malaysia may be important consumers. 3) The recent increases of saiga population are likely to render this species no longer threatened with extinction, with range countries already discussing potential for sustainable use. for example through hunting. Yet the boom and bust population dynamics of this species present a large challenge to the sustainable use of saiga and the conservation of this species in general.

Diogo Veríssimo is a Senior Researcher at the University of Oxford where he focuses on the design and evaluation of behavior change interventions improve the status of biodiversity. He has for 20 years worked on applying social marketing theory and tools to influence biodiversity-relevant behaviors across Latin America, South and Southeast Asia and West and Central Africa in topics as varied as the wildlife trade, human-wildlife conflict or overfishing. Diogo is currently the Chair of the IUCN SSC CEC Task force on Behaviour Change and Board member of the European Social Marketing. He is a past Vice-President of the International Social Marketing Association and Co-founder of the Conservation Marketing Working Group of the Society to Conservation Biology. You can find more information about Diogo's work at <https://ddec1-0-en-ctp.trendmicro.com:443/wis/clicktime/v1/query?url=www.diogoverissimo.com&umid=f830d15b-d153-4072-8347-0accbc845331&auth=8d3ccd473d52f326e51c0f75cb32c9541898e5d5-8d4f29145cb34776942a29a1b63b6449df8e8ab1>

Hotspots of Zoonotic Disease Risk from Wildlife Hunting and Trade in the Tropics

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National University of Singapore

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University of Granada, Spain; National Museum of Natural Sciences (MNCN-CSIC), Spain
Co-principal investigator & Corresponding author

Despite the role of wildlife hunting and trading as drivers of emerging zoonotic diseases, there is a lack of knowledge on which species have high risk of zoonotic disease spillover and on the spatial distribution of hunting and trading zoonotic disease risk. We combined maps of hunting pressure, recent datasets on human-shared pathogens, and trade volumes for 614 mammalian host species to map zoonotic disease risk from hunting and trading pantropically. Correlation between zoonotic disease risk from hunting and probability of emerging zoonotic diseases was modelled using generalized least square regression. We identified hotspots of zoonotic disease risk from hunting in central America, China, and central Africa. When considering wildlife trade frequency, high risk occurs in southern Africa and China. Zoonotic disease risk from wildlife hunting aligns significantly with the risk of zoonotic emerging infectious diseases, suggesting that hunting is a key driver of zoonotic disease outbreaks of pandemic potential.

Jacqueline Wun Pin Choo is a research assistant at the BioEcon lab, National University of Singapore. She is currently working on a project regarding predictors of zoonotic risk and pathogen richness in wildlife species. This project aims to identify hotspots of zoonotic risk and determine species and taxonomic orders with high zoonotic risk from hunting and trading pantropically. To do this, she combined hunting pressure, pathogen data, and trade data to map zoonotic risk from wildlife. She also employed machine learning and zero-inflated modeling to determine the most important predictors of pathogen richness in wildlife and their associated relationships. She has broad interests in biodiversity conservation, spatial ecology, and zoonotic diseases in wildlife. She is keen on using data analysis and modelling using R at a global level to capture patterns across multiple dimensions (e.g. across species, temporal, and spatial trends). She believes that the environment, wildlife, and human health are all interlinked and thus, understanding and protecting the environment and wildlife is vital.

Polyglot Asian Medicine

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This talk introduces primary features of the Polyglot Asian Medicine database. This paper introduces a multi-disciplinary collaborative research platform for the history, ecology and clinical use of Asian medicines. "Polyglot" here refers to the ways that Asian medicines traverse not just region and time, but language and different epistemologies and practice communities. This site provides resources and tools for research into multiple dimensions in three main clusters:

Digitised, tagged, searchable manuscripts

Multiple corpuses, representing Malay, Chinese and Peranakan traditions are available, some with manuscript images. Housed in DocuSky, they facilitate close reading as well as searched and organisation by classifying characteristics at a corpus level, as well as exporting into large-corpus data analytical software.

Digitised historical maps of the *Bencao* traditions

These searchable interactive maps reveal the geolocation of sites of production of *bencao* materia medica, affording novel views of the landscape, local economies, and historical change. Current layers include 2nd to 6th century editions, with more in the pipeline.

Multi-lingual Drug Name Synonymy

Includes 30,000 Chinese primary and secondary drug terms, and 3,000 Malay terms, as well as over 7,000 scientific names updated and verified by Kew Gardens. This Synonymy also includes historical provenance of the terms, including the date, author and author's birthplace (with geotags) (where known). Links from the Chinese and scientific names extend to molecular bioactivity databases, biodiversity heritage, biodiversity maps, allowing for much more rigorous qualification of botanical identities of plants than available before.

Together, these tools and resources can facilitate a new generation of historical and contemporary research on Asian medicines. The data platform is expandable, and open to collaboration. For example, the data tables could be expanded to accommodate animal medicines, and track the origins of the entry of these in the materia medica.

I will demo some of these features, highlight some novel research insights and teaching uses that have been made possible through the site, and discuss some of the forthcoming research agendas.

Michael Stanley-Baker is an assistant professor in History and in LKC Medicine at Nanyang Technological University, Singapore. He researches the history of Chinese medicine, religion and science in China, and has a background in clinical Chinese medicine. He is co-editor of the *Routledge Handbook of Chinese Medicine*, editor of *Situating Medicine and Religion Across Asia*, and PI of the Polyglot Asian Medicine project. He is currently working on a volume titled *Situating Medicine and Religion in Early Imperial China*.

Traditionality and Animal-Based Drugs: A Database Project

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The marketing, trading, regulation and use of medicinal animals in Asia is predicated on consumer assumption that their use is “traditional”. This is true in many instances, as animals are well-documented in Asian medical canons, especially as ingredients in poly-herbal recipes. In other instances it is not true, partially true, or questionable, given that: some species have been introduced into the medical marketplace only since the 1950s; exotic sub-species have been substituted for historically-used ones due to rarity or extinction; more and more parts of the same species have been medicalized; species traditionally used as food have been traded as medicine; the marketability of some long-used medical species has been enhanced in ways not sanctioned traditionally; and critical changes have been made in delivery systems to enhance use. These and other developments have increased the collection, farming, production, and trade of animal tissue, and affected the geographic and historic shape of the medicinal wildlife trade. There’s also been an increase in the diversity of actors and institutions speaking for TM, and with varying credentials and interests.

Our paper will introduce an ongoing research project intended to historicize the use of animals in Asian “traditional” medicines (TM). The “TM Faunal Resources Database”, will provide a more geographically and historically compressive picture of how “medicinal animals” have risen and been transformed as consumable products since 1950. By documenting the details of medicinal classification and trade over time, we hope to sort out the contributions of modern actors and events in editing (adding, subtracting, shifting) faunal resources, and thus bring greater clarity to questions of traditionality. This will in turn bring important information to consumers, the key group in whose hands responsible use of animal medicines rests. TM communities have long approached faunal medicalization as a problem of sustainable supply, while the wildlife conservation community sees it as a problem of species extinction. With the pandemic, the link between the animal trade and zoonotic disease has expanded this arena of concern to include public health. Despite all this attention, an historical and evidentiary-based picture of the regional use and trade of medicinal animals has been lacking. In filling this gap, the database will help to address questions about the changing shape, patterns, and drivers of faunal medicalization, to the benefit of scholars studying TM, the TM community itself (practitioners and consumers), conservation biologists, and policy-makers and regulators tasked with transitioning TM into a “green” (i.e. sustainable and ethical) future.

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Jason Ng is a Research Associate on the History and Sustainability of Animal-Based Drugs in Asian Traditional Medicine project at the Asia Research Institute. He received his MA in Art History from The Courtauld Institute of Art looking at the nexus between art, science, and culture in late nineteenth-century Britain. Aside from the Medicinal Animals project, Jason is also researching the changing role of Kew and other colonial botanic gardens in an era of decolonization.

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Turning a Tiger into a 'Tea Pill': Accounting for Ethical Externalities in the Medicalization of Animal Bodies

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In the field of bioethics and the philosophy of medicine, the status of traditional medicines has been much contested. Some critics have raised questions about the legitimacy and efficacy of so-called “complementary and alternative medicines” (see Schneiderman 2000, Torcello 2013, Shahvisi 2016). Meanwhile, others have staunchly defended traditional and ethnic medicines from criticisms they view as ethnocentrically biased (see Morreim 2003, Kirmayer 2011, Muyskens 2022). Within this fraught landscape the environmental impact of any of the various medical traditions is often overlooked (with the notable recent exceptions of Chatfield 2018 and Chee 2020). This paper will attempt to remedy that gap, and ask the question: is the environmental cost (including the cost to animal welfare entailed in the production of “faunal medicines”) worth the gains to human health from the practice of these traditional medicines? The interconnectedness of human health with planetary and environmental health is increasingly hard to dismiss. But traditional evaluations of the ethicality and efficacy of medicines too often ignores the environmental impact as well as the involvement (and often injury or even outright annihilation) of other species that some human medical practices entail. In this paper, I will attempt to shed some light on what I dub the “ethical externalities” that have thus far been largely ignored in the healthcare ethics literature. Ultimately, I argue that without a true accounting for the environmental effects of any medicine (Asian, traditional, Western, or biomedical) the question of “efficacy” cannot accurately be assessed or meaningfully addressed.

Kathryn Lynn Muyskens is a Research Fellow in the Science Technology and Society Cluster at the Asia Research Institute within the National University of Singapore. She is a philosopher by training with expertise in political philosophy and applied ethics, especially bioethics. Her current research project focuses on the moral questions posed by the spread of online misinformation in relation to public health and the exploration of the social and epistemological dimensions of medical and health-related belief formation online.

Zootherapy Seen through the Lens of Museums of Traditional Medicine

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My research focuses on the narratives regarding zootherapy at the museums of traditional medicine in Asia. The region in question is a unique blend of Eastern and Western medical traditions. The area's rich medico-pharmaceutical heritage includes pharmaceutical practices based on the works of Avicenna, in Central Asia considered to be the father of medicine and pharmacy. Other healing traditions encompass folk and shamanic practices, Soviet medicine and pharmacy, TCM, VTM, listing just a few examples. I aim to explore how museums construct and display narratives about zootherapy by analyzing exhibit displays and museum spaces. This approach investigates museums across several vastly different countries and can expand the literature and provide a better understanding of narratives regarding zootherapy. In thematic museums, including the museums I am analyzing, the exhibits cannot be read at an aesthetic level. They are elements that contribute to the story told to the visitor. The exhibits in thematic museums should be read not individually, but universally. The aim of the exhibition is not to show meaningless exhibits or to create logical assemblages with captions and descriptions. The purpose of museums is to create a specific history, as well as to give meaning and value to the exhibits, according to specific perspectives and classification systems, depending on needs and conditions. Museums' exhibitions are often considered 'truth-tellers' and the story, presented in a museum, is taken for granted.

The paper is based on both literature study and fieldwork. For the comparative research the following museums have been chosen:

- The Museum of Traditional Medicine, Isfara, Tajikistan (MIT)
- The Museum of Traditional Vietnamese Medicine, Ho Chi Minh, Vietnam (MHV)
- The Museum of Traditional Chinese Medicine, Hangzhou, China (MHC)
- The Pharmacy Museum, Lisbon, Portugal (Macau exhibition) (PLP)

During the fieldwork, the layout, design, and appliances were analysed, and photographic documentation of every exhibit was taken. Additionally, the captions were analysed. Based on this, the following narratives, regarding zootherapy, can be observed:

- No animals are used; traditional medicine is based on plants, (MIT)
- Animal products are used; bees products, (beeswax, bee pollen, propolis and royal jelly), gastrointestinal bezoars, bear bile, snake bile, (MHC, MHV, PLP)
- Animal tissues are used: bear paws, tiger bones, antelope, buffalo or rhino horns (MHC, MHV).

The museums in question present zootherapy in two ways; either as medicine and pharmacy from the past (PLP) or as a continuous part of the medical and pharmaceutical tradition—explained as wisdom through the ages—as a part of contemporary medicine. (MHC, MHV).

Katarzyna Jarosz is a linguist and archaeologist. She received her M.A. in Romance languages- French and Spanish linguistics, and MA in archaeology followed by a PhD in archaeology with a specialization history of archaeology. She has taught and worked as a researcher in various institutions in Poland. Her research interests cover the issue of relationships between science and society, archaeology and politics and mechanisms of cultural heritage protection, and the history of science and museum studies, with a focus on cultural heritage protection and cultural tourism. Her fluent knowledge of Romance languages, Russian, Albanian, Romanian and Swedish allows her to conduct research that is both in-depth and at pace. Her research was funded by Gulbenkian Foundation and The Center for the History of Global Development at Shanghai University. She has conducted several field trips to Central Asia: Kyrgyzstan, Uzbekistan and Kazakhstan. Her latest publication is Jarosz K. The Development of Museums of Pharmacy in Post-Soviet Countries *Pharmacy in History* 2021 62(3-4):135-149. Her forthcoming publication is Jarosz K. Soviet life cycle and ageing: Through the lens of museums of medicine [in] *Aging in the Soviet Union*, Bloomsbury (in print, February 2023).

ABOUT THE CHAIRPERSONS

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L. Roman Carrasco obtained his PhD from Imperial College London on environmental modelling. He is now an Associate Professor at the Department of Biological Sciences. His research interests are interdisciplinary and reside within the divide of ecology and economics. The main question he has been trying to answer is how to reconcile agricultural production and biodiversity conservation in the tropics. To answer this question, he studies the main drivers of biodiversity loss with a special emphasis on the wildlife trade. He is a Collaborator in the MOE Tier 2 grant project “History and Sustainability of Animal-Based Drugs in Asian Traditional Medicines”
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