**Supplementary material**

**The diversity in the genus *Canis* challenges** **taxonomy: a review of Asian wolves**

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**Table S1.** Overview of the literature reviewed with study authors, study title, lineage, and region sorted by Region.

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| **Authors** | **Title** | **Lineage** | **Region or Country** |
| Barichievy et al., 2017 | Association between an Arabian wolf and a domestic dog in central Saudi Arabia | *C. l. arabs* | Arabia (Saudi Arabia) |
| Biquand et al., 1994 | Fishes as diet of a wolf (*Canis lupus arabs*) in Saudi Arabia | *C. l. arabs* | Arabia (Saudi Arabia) |
| Bray et al., 2014 | Genetic variation and subspecific status of the grey wolf (*Canis lupus*) in Saudi Arabia | *C. l. arabs* | Arabia |
| Cunningham and Wronski, 2010 | Arabian wolf distribution update from Saudi Arabia | *C. l. arabs* | Arabia (Saudi Arabia) |
| Cohen et al., 2013  | Conflicting management policies for the Arabian wolf *Canis lupus arabs* in the Negev Desert: is this justified? | *C. l. arabs* | Arabia (Saudi Arabia) |
| Gecchele et al., 2017 | A pilot study to survey the carnivore community in the hyper-arid environment of South Sinai mountains | *C. l. arabs* | Arabia (Saudi Arabia) |
| Hefner and Geffen, 1999 | Group Size and Home Range of the Arabian Wolf (*Canis lupus*) in Southern Israel  | *C. l. arabs* | Arabia (Saudi Arabia) |
| Islam et al., 2014 | Poisoning of endangered Arabian leopard in Saudi Arabia and its conservation efforts | *C. l. arabs* | Arabia (Saudi Arabia) |
| Islam et al., 2019 | Geographic distribution patterns of melanistic Arabian Wolves, *Canis lupus arabs* (Pocock), in Saudi Arabia (Mammalia: Carnivora) | *C. l. arabs* | Arabia (Saudi Arabia) |
| Mallon, 2011  | Global hotspots in the Arabian Peninsula | *C. l. arabs* | Arabia (Saudi Arabia) |
| Wronski and Macasero, 2008 | Evidence for the persistence of Arabian Wolf (Canis lupus pallipes) in the Ibex Reserve, Saudi Arabia and its preferred prey species | *C. lupus*  | Arabia |
| Matsumura et al., 2014 | Reconstructing the colonization history of lost wolf lineages by the analysis of the mitochondrial genome |  *C. lupus* | Asia (Japan) |
| Tsuda et al., 1997 | Extensive interbreeding occurred among multiple matriarchal ancestors during the domestication of dogs: evidence from inter-and intraspecies polymorphisms in the … | *C. lupus* | Asia |
| Pilot et al., 2014 | Genetic variability of the grey wolf Canis lupus in the Caucasus in comparison with Europe and the Middle East: distinct or intermediary population? | *C. l. cubanensis* | Central Asia |
| Trepet and Eskina, 2018 | The Ratio of Ungulates to Wolves in the Caucasian Nature Reserve | *C. lupus* | Central Asia |
| Janssens et al., 2016 | The morphology of the mandibular coronoid process does not indicate that *Canis lupus chanco* is the progenitor to dogs | *C. l. chanco* | China |
| vonHoldt et al., 2017 | EPAS1 variants in high altitude Tibetan wolves were selectively introgressed into highland dogs | *C. lupus* | China |
| Li et al., 2011 | Complete sequence of the Tibetan Mastiff mitochondrial genome and its phylogenetic relationship with other *Canids* (*Canis*, *Canidae*) | *C. l. laniger* | China |
| Li et al., 2013 | Patterns of Livestock Predation by Carnivores: Human–Wildlife Conflict in Northwest Yunnan, China | *C. lupus* | China |
| Li et al. 2014 | Population Variation Revealed High-Altitude Adaptation of Tibetan Mastiffs | *C. lupus* | China |
| Liu and Jiang, 2003 | Diet composition of wolves *Canis lupus* in the northeastern Qinghai-Tibet Plateau, China | *C. lupus*  | China |
| Meng et al. 2009 | Mitochondrial genome of the Tibetan wolf | *C. l. laniger* | China |
| Pang et al., 2009 | mtDNA Data Indicate a Single Origin for Dogs South of Yangtze River, Less Than 16,300 Years Ago, from Numerous Wolves | *C. lupus* | China |
| Wang et al., 2016 | The geographical distribution of grey wolves (*Canis lupus*) in China: a systematic review | *C. lupus* | China |
| Wang et al., 2019 | Genomic Approaches Reveal an Endemic Subpopulation of Gray Wolves in Southern China | *C. lupus* | China |
| Wang et al., 2020 | Ancient hybridization with an unknown population facilitated high altitude adaptation of canids | *C. l. chanco* | China |
| Zhang et al., 2014 | Hypoxia Adaptations in the Grey Wolf (*Canis lupus chanco*) from Qinghai-Tibet Plateau | *C. l. chanco*  | China |
| Zhao et al., 2013 | The complete mitochondrial genome sequence of the Tibetan wolf (*Canis lupus laniger)* | *C. l. laniger* | China (Tibet) |
| Zhang and Chen, 2010 | Phylogenetic analysis of 16S rRNA gene sequences reveals distal gut bacterial diversity in wild wolves (*Canis lupus*) | *C. lupus* | China (Inner Mongolia) |
| Zhao et al., 2013 | The complete mitochondrial genome of Chinese Shinjang wolf | *C. l. desertorum* | China (Xinjiang) |
| Álvares et al., 2019 | Old World Canis spp. with taxonomic ambiguity: Workshop conclusions and recommendations. | *C. l. chanco* | Eurasia |
| Hennelly et al., 2017 | Howl variation across Himalayan, North African, Indian, and Holarctic wolf clades: tracing divergence in the world’s oldest wolf lineages using acoustics | *C. lupus, C. l. pallipes, C. l. lupaster, C. l. chanco* | Eurasia |
| Hennelly et al. 2021 | Ancient divergence of Indian and Tibetan wolves revealed by recombination-aware phylogenomics  | *C. l. pallipes, C. l. chanco* | Eurasia |
| Ledoux and Boudadi-Maligne, 2015  | The contribution of geometric morphometric analysis to prehistoric ichnology: the example of large canid tracks and their implication for the debate concerning wolf domestication | *C. l. albus* | Eurasia |
| Sotnikova and Rook, 2010 | Dispersal of the Canini (Mammalia, Canidae: Caninae) across Eurasia during the Late Miocene to Early Pleistocene | *C. lupus* | Eurasia |
| UNEP-WCMC., 2012 | Fauna: new species and other taxonomic changes relating to species listed in the EC wildlife trade regulations. A report to the European Commission. | *C. l. chanco*  | Eurasia |
| Agnarsson et al., 2010  | Dogs, cats, and kin: A molecular species-level phylogeny of Carnivora | *C. l. chanco* | Global |
| Boitani et al. 2018 | IUCN Assessment for *Canis lupus* | *C. lupus* | Global |
| Castelló 2018 | Canids of the World: Wolves, Wild Dogs, Foxes, Jackals, Coyotes, and Their Relatives | *C. lupus* | Global |
| Ersmark et al., 2016 | From the Past to the Present: Wolf Phylogeography and Demographic History Based on the Mitochondrial Control Region | *C. lupus* | Global |
| Fan et al., 2016 | Worldwide patterns of genomic variation and admixture in gray wolves | *C. lupus* | Global |
| Freedman et al. 2014 | Genome Sequencing Highlights the Dynamic Early History of Dogs. | *C. lupus* | Global |
| Gopalakrishnan et al. 2018 | Interspecific Gene Flow Shaped the Evolution of the Genus Canis. | *C. lupus* | Global |
| Koblmüller, 2016 | Whole mitochondrial genomes illuminate ancient intercontinental dispersals of grey wolves (*Canis lupus*) | *C. lupus* | Global |
| Leonard et al., 2007 | Megafaunal Extinctions and the Disappearance of a Specialized Wolf Ecomorph | *C. lupus* | Global |
| Loog et al., 2018 | Modern wolves trace their origin to a late Pleistocene expansion 1 from Beringia | *C. lupus* | Global |
| Pilot et al., 2010 | Phylogeographic history of grey wolves in Europe | *C. lupus* | Global |
| Sillero-Zubiri et al., 2004 | Canids: Foxes, Wolves, Jackals and Dogs. Status Survey and Conservation Action Plan | *C. lupus* | Global |
| Sotnikova and Rook, 2010 | Dispersal of the Canini (Mammalia, Canidae: Caninae) across Eurasia during the Late Miocene to Early Pleistocene | *C. lupus* | Global |
| Vilà et al., 1999 |  Mitochondrial DNA phylogeography and population history of the grey wolf *Canis lupus* | *C. lupus* | Global |
| Aggarwal et al., 2007 | Mitochondrial DNA coding region sequences support the phylogenetic distinction of two Indian wolf species | *C. l. chanco/ himalayensis* | India |
| Ahmed et al., 2018 | Dietary Spectrum of Two Sympatric Canid Species in Ladakh, India | *C. l. chanco*  | India |
| Bhattacharya and Sathyakumar, 2010  | Sighting of Tibetan Wolf Canis lupus chanko in the Greater Himalayan range of Nanda Devi Biosphere Reserve, Uttarakhand, India: a new record | *C. l. chanco* | India |
| Choudhury, 2015  | The Tibetan Wolf Canis lupus chanco Gray (Mammalia: Carnivora: Canidae) in northeastern India with a recent sighting from northern Sikkim, India | *C. l. chanco* | India |
| Habib et al., 2013  | Ecology and Conservation of Himalayan Wolf | *C. l. chanco*  | India |
| Jamwal et al., 2019  | Factors contributing to a striking shift in human–wildlife dynamics in Hemis National Park, India: 22 years of reported snow leopard depredation | *C. l. chanco*  | India |
| Jhala and Giles, 1991 | The Status and Conservation of the Wolf in Gujarat and Rajasthan, India | *C. l. pallipes* | India |
| Jhala, 1993 | Predation on Blackbuck by Wolves in Velavadar National Park, Gujarat, India | *C. l. pallipes* | India |
| Jhala 2003 | Status, ecology and conservation of the Indian wolf Canis lupus pallipes Sykes | *C. l. pallipes* | India |
| Habib et al., 2013 | Ecology and Conservation of Himalayan Wolf. Wildlife Institute of India–Technical Report  | *C. l. chanco*  | India |  |
| Hennelly et al. 2015 | Himalayan wolf and feral dog displaying mating behaviour in Spiti Valley, India, and potential conservation threats from sympatric feral dogs. | *C. l. chanco* | India |  |
| Ghoshal et al., 2017 | Assessing changes in distribution of the Endangered snow leopard *Panthera uncia* and its wild prey over 2 decades in the Indian Himalaya through interview-based occupancy surveys | *C. l. chanco*  | India |
| Mishra, 1997 | Livestock depredation by large carnivores in the Indian trans-Himalaya: conflict perceptions and conservation prospects | *C. l. chanco*  | India |
| Mukherjee et al., 2010  | An evaluation of the PCR-RFLP technique to aid molecular-based monitoring of felids and canids in India | *C. l. chanco*  | India |
| Saad et al., 2015 | Distribution range and population status of Indian grey wolf (Canis Lupus Pallipes) and Asiatic jackal (Canis Aureus) in Lehri Nature Park, District Jhelum. | *C. l. pallipes* | India |
| Shankar et al., 2019  | Indian Grey Wolf: first photographic record of *Canis lupus pallipes* from Papikonda National Park in northern Eastern Ghats, India | *C. l. pallipes* | India |
| Sharma et al., 2004 | Ancient wolf lineages in India | *C. l. chanco/ himalayensis* | India |
| Sharma, 2009 | Haematological and Biochemical values of Tibetan Wolf (*Canis lupus chanco)* | *C. l. chanco*  | India |
| Sharma et al., 2019 | Identifying suitable habitat and corridors for Indian Grey Wolf (*Canis lupus pallipes*) in Chotta Nagpur Plateau and Lower Gangetic Planes: A species with differential management needs | *C. l. pallipes* | India |
| Shrotryia et al., 2012 | Wolves in Trans-Himalayas: 165 years of taxonomic confusion | *C. l. chanco*  | India |
| Singh and Kumara, 2006 | Distribution, status and conservation of Indian gray wolf (*Canis lupus pallipes*) in Karnataka, India | *C. l. pallipes* | India |
| Suryawanshi et al., 2014 | People, predators and perceptions: patterns of livestock depredation by snow leopards and wolves | *C. lupus* | India |
| Srinivas and Jhala, 2021 | Morphometric variation in wolves and golden jackal in India (Mammalia, Carnivora). | *C. l. pallipes, C. l. chanco, C. l. aureus* | India |
| Srivastav and Nigam, 2009  | National Pedigree Book of Tibetan Wolf (*Canis lupus chanco*) | *C. l. chanco* | India |
| Khosravi et al., 2013 | Detecting Hybridization between Iranian Wild Wolf (Canis Lupus Pallipes) and Free-Ranging Domestic Dog (Canis Familiaris) by Analysis of Microsatellite Markers | *C. lupus*  | Iran |
| Khosravi et al., 2012 | Morphometric variations of the skull in the Gray Wolf (Canis lupus) in Iran | *C. lupus* | Iran |
| Tourani et al., 2014  | Anthropogenic effects on the feeding habits of wolves in an altered arid landscape of central Iran | *C. lupus* | Iran |
| Ishiguro et al., 2009 | Mitochondrial DNA Analysis of the Japanese Wolf (Canis Lupus Hodophilax Temminck, 1839) and Comparison with Representative Wolf and Domestic Dog Haplotypes | *C. l. hodophilax*  | Japan |
| Ishiguro et al., 2010 | Osteological and Genetic Analysis of the Extinct Ezo Wolf (*Canis Lupus Hattai*) from Hokkaido Island, Japan | *C. l. hattai* | Japan |
| Hazell, 2001 | The status of the wolf population in post-Soviet Kyrgyzstan | *C. lupus* | Kyrgyzstan |
| Jumabay-Uulu et al., 2014 | Large carnivores and low diversity of optimal prey: a comparison of the diets of snow leopards *Panthera uncia* and wolves *Canis lupus* in Sarychat-Ertash Reserve in Kyrgyzstan | *C. lupus* | Kyrgyzstan |
| McCarthy et al., 2010 | Assessing Variation in Wildlife Biodiversity in the Tien Shan Mountains of Kyrgyzstan Using Ancillary Camera-trap Photos | *C. lupus* | Kyrgyzstan |
| Chen et al., 2011 | Population, distribution and food composition of wolves (*Canis lupus*) at Saihanwula Nature Reserve, Inner Mongolia | *C. lupus* | Mongolia |
| Davie et al., 2014 | Measuring and mapping the influence of landscape factors on livestock predation by wolves in Mongolia | *C. lupus* | Mongolia |
| Duyne et al., 2009 | Wolf predation among reintroduced przewalski horses in Hustai National Park, Mongolia | *C. lupus* | Mongolia |
| Hovens and Tungalaktuja, 2005 | Seasonal fluctuations of the wolf diet in the Hustai National Park (Mongolia) | *C. lupus* | Mongolia |
| Kaczensky et al., 2008 | The Great Gobi B Strictly Protected Area in Mongolia - refuge or sink for wolves *Canis lupus* in the Gobi | *C. lupus* | Mongolia |
| Zhang et al., 2013 | Complete mitochondrial genome of *Canis lupus campestris* | *C. l. campestris*  | Mongolia & Inner Mongolia (China) |
| Chetri et al., 2016 | Ancient Himalayan wolf (*Canis lupus chanco*) lineage in Upper Mustang of the Annapurna Conservation Area, Nepal | *C. l. chanco*  | Nepal |
| Subba, 2012 | Assessing the genetic status, distribution, prey selection and conservation issues of Himalayan wolf (Canis himalayensis) in Trans-Himalayan Dolpa, Nepal | *C. l. chanco /himalayensis* | Nepal |
| Subba et al., 2016 | Distribution of grey wolves *Canis lupus lupus* in the Nepalese Himalaya: implications for conservation management | *C. l. chanco*  | Nepal |
| Werhahn et al., 2017 | Phylogenetic evidence for the ancient Himalayan wolf: towards a clarification of its taxonomic status based on genetic sampling from western Nepal | *C. l. chanco/himalayensis* | Nepal |
| Werhahn et al., 2018 | The unique genetic adaptation of the Himalayan wolf to high-altitudes and consequences for conservation | *C. l. chanco*  | Nepal |
| Werhahn et al., 2020 | Himalayan wolf distribution and admixture based on multiple genetic markers | *C. l. chanco*  | Nepal |
| Ali et al., 2016 | Human-Grey Wolf (*Canis lupus* Linnaeus, 1758) Conflict in Shounther Valley, District Neelum, Azad Jammu and Kashmir, Pakistan | *C. lupus* | Pakistan |
| Bocci et al., 2017 | Sympatric snow leopards and Tibetan wolves: coexistence of large carnivores with human-driven potential competition | *C. lupus* | Pakistan |
| Hamid et al., 2019 | Origin, ecology and human conflict of gray wolf (Canis lupus) in Suleman Range, South Waziristan, Pakistan | *C. lupus* | Pakistan |
| Kabir et al., 2017 | Habitat suitability and movement corridors of grey wolf (*Canis lupus*) in Northern Pakistan | *C. lupus* | Pakistan |
| Shabbir et al., 2013 | Food habits and diet overlap of two sympatric carnivore species in Chitral, Pakistan.  | *C. lupus* | Pakistan |
| Forbes, 1999 | Reindeer herding and petroleum development on Poluostrov Yamal: sustainable or mutually incompatible uses? | *C. l. albus* | Russia (Siberia) |
| Karimov et al., 2018 | Responses of snow leopards, wolves and wild ungulates to livestock grazing in the Zorkul Strictly Protected Area, Tajikistan | *C. lupus* | Tajikistan |
| Squires and Safarov, 2013  | High-altitude ecosystems and Biodiversity of Tajikistan: Conservation and Management | *C. lupus* | Tajikistan |

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