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continued on the back inside cover

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Dark Clouds Ahead? Anecdotal evidence for an illegal live trade in Sunda *Neofelis diardi* and Indochinese *N. nebulosa* Clouded Leopards (Mammalia: Carnivora: Felidae)

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The Sunda Clouded Leopard *Neofelis diardi* and Indochinese Clouded Leopard *N. nebulosa* are medium-sized felids native to tropical southern and southeastern Asia. The only two extant members of their genus, both species exhibit morphological adaptations consistent with arboreality (Van Valkenburgh 1987; Hubbard et al. 2009) and share a common ancestry with other extant pantherine felids (Johnson et al. 2006). Collectively, clouded leopards occur from Nepal east to Vietnam and south through the Indo-Malay Archipelago (*N. nebulosa*) into Sumatra and Borneo (*N. diardi*) (Hearn et al. 2015; Grassman et al. 2016). Both species were historically

treated as a single phenotypically variable species until recently, when closer molecular and morphological scrutiny yielded evidence of two distinct species (Buckley-Beason et al. 2006; Kitchener et al. 2006).

Clouded leopards primarily inhabit tropical forests across their range, particularly lowland dipterocarp forests. Limestone forests, upland tropical evergreen and deciduous forest, lowland seasonal and mixed deciduous forest, and peat swamp forests (Rabinowitz et al. 1987; Rabinowitz 1988; Rabinowitz & Walker 1991) are also considered suitable habitats. They appear able to persist in fragmented, isolated forests, and forests where

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selective logging occurs (Mohd-Azlan & Lading 2006; Brodie & Giordano 2012; Brodie et al. 2015). Though their prey has never been investigated in detail, it is likely that clouded leopards prey largely upon ungulates, and primates both on the ground and in the canopy; data gathered anecdotally thus far at least supports this (Matsuda et al. 2008; Morino 2010; Giordano & Rustam 2016; Giordano 2022). Threats to the survival of both species include deforestation, particularly for oil palm, indiscriminate poaching via snaring, and intentional hunting for illegal trade in skins and parts (Hearn et al. 2015; Grassman et al. 2016; Giordano 2022). Both are CITES Appendix I species, with international trade in live animals or their parts prohibited without explicit official permission by the governments of range countries. They are protected legally from hunting by national wildlife legislation across their range.

In 2019, we began an investigation of the trade in clouded leopards and their parts in Asia. This was partly inspired by social media posts we discovered of a live Sunda Clouded Leopard apparently kept by an exotic pet dealer (Image 1). Our online investigations continued with respect to how and where clouded leopards are sold on social media and other digital platforms, irrespective of laws and policies prohibiting such activities. Although these investigations are still ongoing, we discovered more than one-half dozen social media posts and local language news articles, that we believe are indicative of an illegal live trade in Sunda Clouded Leopards in Indonesia (Image 2a,b). In addition, also discovered at least one older incident that involved young Indochinese Clouded Leopards (Image 3) originating from the Lao

PDR, which were confiscated along the national borders of Thailand and Myanmar. Several of these incidents were supported or accompanied by photos of a clouded leopard in a small cage, consistent with those often used at markets, or at a post-confiscation publicity event coordinated by law enforcement for the media. Our work expands somewhat on an aspect of D’Cruze & Macdonald (2015), which highlighted records of live trade in clouded leopards as exotic pets, and possibly for exotic food dishes (e.g., IUCN SSC Cat Specialist Group 1987). Their data also highlighted the changing trends in CITES records of the ‘purpose’ of live-traded clouded leopards over several decades. They further characterized a major shift toward ‘commercial use’, which constituted more than half of all trade in the decade and a half leading up to 2013. Our work therefore expands somewhat on D’Cruze & Macdonald (2015) and provides new evidence of the species allegedly for illegal sale as an exotic pet on social media.

New evidence of live trade in other carnivores from Indonesia, and possibly Malaysia, has also emerged recently, and can provide further context for a possible emerging live trade in Sunda Clouded Leopards. Some species for which fewer historical records of trade exists, for example, such as ‘Vulnerable’ Small-clawed Otters *Aonyx cinereus* and Smooth-coated Otters *Lutrogale perspicillata* (de Silva et al. 2015; Wright et al. 2015), are among those species recently identified as threatened by increased live trade (Gomez & Bouhuys 2018). This appears in large part to be driven by their popularity and portrayal as pets on social media (Harrington et al. 2019). Similarly, the Otter Civet *Cynogale bennettii*,



Image 1. Screen grab of a ‘pet’ Sunda Clouded Leopard *Neofelis diardi* on Facebook in Indonesia.

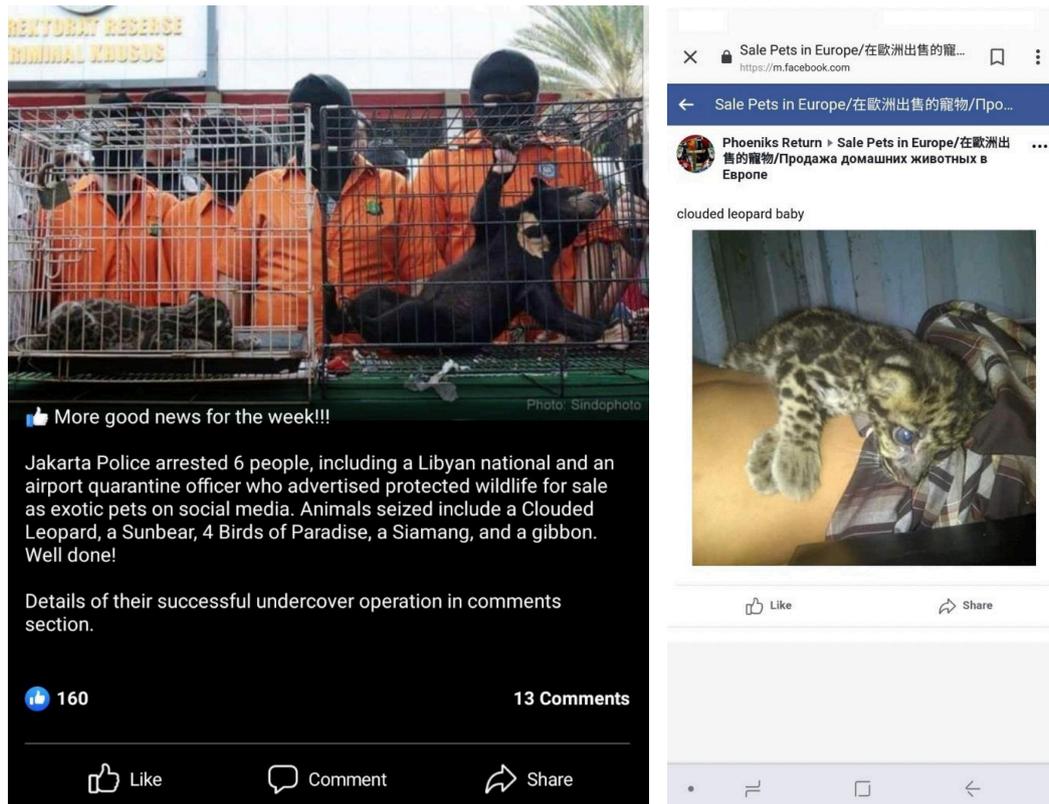


Image 2. Screen grabs of Facebook postings: a—wildlife seized by Jakarta police, including a Sunda Clouded Leopard and a Sun Bear. © Sindophoto | b—a posting purportedly showing a Sunda Clouded Leopard kitten for sale in Europe.



Image 3. Two Clouded Leopards confiscated by Thai authorities en route from Laos. Here they are being temporarily cared for by the local zoo. © Terry Whittaker.

a small 'Endangered' viverrid (Ross et al. 2015) also native to southeastern Asia, was recently observed for sale on an Indonesian Facebook group (Bouhuys 2019), the first known report for the species. Live trade in all carnivores across the region, including mongoose, ferret badgers, and civets (Shepherd 2012; Nijman et al. 2014) has largely been unregulated to date, and many species appear to be increasing in popularity as 'novelty pets' (Bouhuys 2019). Changes in the demand for different species are known to occur through time, as evidenced by Indonesia's primate markets (Nijman et al. 2015). Such patterns, particularly as influenced by social media, may have implications for future live trade in Sunda Clouded Leopards. Interestingly, other than the one record we present of two live Indochinese Clouded Leopards, we uncovered few unequivocal records of live trade in the species, whether as pets or otherwise. Given however there exists evidence of larger felids like leopards and tigers kept locally as pets in the region, including in Myanmar (Min 2020), it is possible we just haven't yet uncovered adequate evidence supporting more widespread live trade in Indochinese Clouded Leopards. In contrast to the live pet trade in cheetahs in the Middle East (Tricorache et al. 2018; Spee et al. 2019), the cultural origins of which may relate to their historical use for hunting other prey (Masseti 2009), some live trade in Sunda Clouded Leopards could be related to local opportunistic hunting, which appears widespread on Borneo (Mohd-Azlan et al. 2017). The incidental killings of mother Clouded Leopards for example, could pave the way to more opportunities for selling kittens or cubs at regional markets. Regardless of the pathway to the marketplace, there is real concern that social media activity risks normalizing the keeping of threatened and endangered species as exotic pets (Moloney et al. 2020), and thus the expansion of potential markets.

We recommend that additional international attention and investment of resources, including local, national, and international law enforcement activities, focus their efforts on the growing trade in clouded leopards. We further note that the potential threats to human safety in the trafficking of live animals in the form of disease, particularly given the potential of cats and other carnivores to facilitate transmission of coronaviruses (Bell et al. 2004; Matharvarajah & Dellaire 2020), should further serve as incentive to end all illegal trade in these species.

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Communications

Presence of medium and large sized terrestrial mammals highlights the conservation potential of Patharia Hill Reserve in Bangladesh

– M. Aminur Rahman, Ai Suzuki, M. Sunam Uddin, M. Motalib, M. Rezaul Karim Chowdhury, Ameer Hamza & M. Abdul Aziz, Pp. 23283–23296

Diversity and abundance of aquatic birds in Koonthankulam village pond, Tamil Nadu, India

– Selvam Muralikrishnan, Esakkimuthu Shanmugam, Natarajan Arun Nagendran & Duraisamy Pandiaraja, Pp. 23297–23306

Plastral deossification zones in the Endangered Spiny Hill Turtle *Heosemys spinosa* (Testudines: Geoemydidae) on Borneo

– Siti Nor Baizurah & Indraneil Das, Pp. 23307–23314

Addition of four new records of pit vipers (Squamata: Crotalinae) to Manipur, India

– Premjit Singh Elangbam, Lal Biakzuala, Parag Shinde, Ht. Decemson, Mathipi Vabeiryureilai & Hmar Tlawmte Lalremsanga, Pp. 23315–23326

Addition to the Odonata fauna of Tripura, India

– Dhiman Datta, B.K. Agarwala & Joydeb Majumder, Pp. 23327–23337

Occurrence and distribution of two new libellulids (Odonata: Insecta) of the Kashmir Valley, India: *Orthetrum sabina* (Drury, 1770) and *Palpopleura sexmacaluta* (Fabricius, 1787)

– Tahir Gazanfar & Mehreen Khaleel, Pp. 23338–23343

Rayed Thistle Fly *Tephritis cometa* Loew (Diptera: Tephritidae) a new record to India

– Rayees Ahmad, Tariq Ahmad & Barkat Hussain, Pp. 23344–23349

New state records of some Dermaptera De Geer, 1773 (Insecta) species in India

– Tanusri Das, Kochumackel George Emiliyamma & Subhankar Kumar Sarkar, Pp. 23350–23358

Moth diversity of Guindy, Chennai, India and DNA barcoding of selected erebid moths

– Sreeramulu Bhuvargavan, Mani Meenakumari, Ramanathan Nivetha & Sundaram Janarthanan, Pp. 23359–23372

New record of the sphingid moth *Acherontia styx* Westwood, its parasitoid *Trichogramma achaeae* in Jasmine *Jasminum sambac* L., and its bioecology

– I. Merlin K. Davidson, Pp. 23373–23381

Identification and phylogenetic analysis of various termite species distributed across southern Haryana, India

– Bhanupriya, Shubhankar Mukherjee, Nidhi Kakkar & Sanjeev K. Gupta, Pp. 23382–23396

Survey of Black Band Disease-affected scleractinian corals via drone-based observations in Okinawa, Japan

– Rocktim Ramen Das, Parviz Tavakoli-Kolour, Sanaz Hazraty-Kari & James Davis Reimer, Pp. 23397–23402

Trace elements in *Penaeus* shrimp from two anthropized estuarine systems in Brazil

– Ana Paula Madeira Di Benedetto, Inácio Abreu Pestana & Cássia de Carvalho, Pp. 23403–23407

Aquatic Hemiptera inhabiting rice fields in Karaikal, Puducherry, India

– M. Kandibane & L. Gopianand, Pp. 23408–23415

Leaf defoliation and *Tabernaemontana rotensis* (Asterids: Gentianales: Apocynaceae) flower induction and fruit development

– Thomas E. Marler, Pp. 23416–23424

Short Communications

First record and DNA barcode of a scarab beetle, *Adoretus kanarensis* Arrow, 1917 (Coleoptera: Scarabaeidae: Rutelinae), from Maharashtra, India

– Pranil Jagdale, Sujata Magdum, Aparna Sureshchandra Kalawate, Swapnil Kajale & Yogesh Shouche, Pp. 23425–23430

New record of *Lucilia cuprina* (Wiedemann, 1830) (Diptera: Calliphoridae) from the Trans-Himalayan Region, cold arid desert of Kargil Ladakh, India

– Mohd Hussain, Altaf Hussain Mir, Hidayatullah Tak & Nassreen Fatima Kacho, Pp. 23431–23435

On the occurrence of *Nitella myriotricha* A.Braun ex Kützing, 1857 ssp. *acuminata* D.Subramanian, 1999 (Charophyceae: Charales: Characeae), from eastern India

– Kailash Mondal & Jai Prakash Keshri, Pp. 23436–23440

Notes

Dark Clouds Ahead? Anecdotal evidence for an illegal live trade in Sunda *Neofelis diardi* and Indochinese *N. nebulosa* Clouded Leopards (Mammalia: Carnivora: Felidae)

– Anthony J. Giordano, Leah M. Winstead, Muhammad Ali Imron, Rustam, Jephthe Sompud, Jayaraj Vijaya Kumaran & Kurtis Jai-Chyi Pei, Pp. 23441–23445

Further photographic record of Asiatic Brush-tailed Porcupine *Atherurus macrourus* Linnaeus, 1758 (Mammalia: Rodentia: Hystricidae) from Manas National Park, Assam, India

– Urjit Bhatt, Bilal Habib & Salvador Lyngdoh, Pp. 23446–23448

Predation of the Nicobar Shrew *Crociodura nicobarica* by a Cattle Egret *Bubulcus ibis*

– G. Gokulakrishnan, C.S. Vishnu & Manokaran Kamalakannan, Pp. 23449–23451

War prompts distress symptoms in Israeli Blind Snake

– Shahr Dubiner, Shai Meiri & Eran Levin, Pp. 23452–23454

Further distribution records of *Varadia ambolensis* (Stylommatophora: Helicarionoidea) from the state of Goa

– Nitin Sawant, Shubham Rane, Sagar Naik, Seema Vishwakarma & Mayur Gawas, Pp. 23455–23457

***Eleocharis acutangula* ssp. *neotropica* D.J.Rosen (Cyperaceae): a new record for southern Western Ghats, India**

– Kavya K. Nair & A.R. Viji, Pp. 23458–23460

Book Review

Putting wetland science to practice: a review

– Review by Tiasa Adhya & Partha Dey, Pp. 23461–23462

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