

LSM4254: Principles of Taxonomy and Systematics

Documentations/ Literature Search for the Species Page of *Presbytis femoralis*

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Literature searches and documentations from (mid October 2013 – 28th November 2013).

The species page <http://taxo4254.wikispaces.com/Presbytis+femoralis> will hereby be known as “taxopres”.

- Before starting out, I have planned to do a summary of the page at the top of the webpage and put a nice photo that represent the banded leaf monkey as a prompt before readers scroll down further. I then set out with an attempt to create a comprehensive compilation/consolidation of all the resources and information that I can gather within the time frame that I have (this is because most of the backbone (bare bone) information with all the simplified general data of the banded leaf monkey in Singapore has already been done in other species pages such as that listed below) before the due date of this Species Page project (which is a coursework for the module LSM4254 Principles of Taxonomy and Systematics offered by the Department of Biological Sciences in NUS).
- The preliminary structure and information of the website is first drafted out on Microsoft Office Word 2007 intermittently from the middle of October to 14th November 2013 (it was tentatively formatted and transferred to <http://taxo4254.wikispaces.com> at 5:42am) to prepare for the draft presentation of the species page to the class of LSM4254 at NUS LS Lab 5 Blk S1A Level 4, November 14th 2013 from 2pm to 6pm. From then (14th November 2013) onwards, changes and

addition of information to the website is done online at “<http://taxo4254.wikispaces.com>” by using the Editor tools available.

- A rough outline of how the “taxopres” would be structured and also baseline information of the banded leaf monkey in Singapore for “taxopres” is first and foremost obtained from the 2011’s “Singapore Biodiversity, An Encyclopedia of the Natural Environment and Sustainable Development” (I borrowed this book from Mr Chua Keng Soon, the herbarium curator of the Raffles Museum of Biodiversity Research) and 2012’s Private Lives: An Exposé of Singapore’s Rainforests (I borrowed this book from Eunice Soh, the creator of the *Proatta butteli* species page at taxo4254.wikispaces.com).
- Initial online search was done using Google search engine (google.com) using these terms, “*Presbytis femoralis*” and “banded leaf monkeys”. General news, interesting facts (eg: the last banded leaf monkeys of Bukit Timah Nature Reserve (BTNR) was mauled to death by 5 dogs and reports of it committing suicide because it is getting bored at being confined to a small habitat at BTNR), and species pages done by others are uncovered such as:-
 - en.wikipedia.org/wiki/Banded_surili
 - www.wildsingapore.per.sg/discovery/factsheet/bandleafmonkey.htm
 - www.ecologyasia.com/verts/mammals/banded-leaf-monkey.htm
 - <http://evolution.science.nus.edu.sg/monkey.html>
 - <http://nusbiodiversity.wordpress.com/2010/04/12/hui-fangs-banded-leaf-monkey-work-in-the-straits-times/>
 - <http://www.iucnredlist.org/details/18126/0>
 - <http://lovemacritchie.wordpress.com/banded-leaf-monkey/>
 - http://infopedia.nl.sg/articles/SIP_1472_2009-02-26.html
 - http://www.theprimata.com/presbytis_femoralis.html
 - <http://www.andieang.org/asian-colobines/banded-leaf-monkey>
- Photos and audio recording of the banded leaf monkey as found on wildsingapore.per.sg are downloaded to be used for “taxopres” after permission is sought for and granted by the author, Chan Kwok Wai. His contact can be found at Contact tab on top of the wildsingapore.per.sg banded leaf monkey webpage itself, which is “c_kwokwai@yahoo.com”.
- Regarding the photographs of the Banded Leaf Monkey, I’ve also visited ARKive (arkive.org), an online deposit of endangered wildlife imagery, and tried contacting Daniel Koh (the photographs of Banded Leaf Monkeys at ARKive are mostly from him) at stee69@pacific.net.sg but my email got bounced back, hence, he is unreachable and I abandon the idea of using his photographs.

- The information on the species page of the banded leaf monkey at the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (<http://www.iucnredlist.org/details/18126/0>) is used for the “Conservation” and “Nomenclature” section of “taxopres”. This IUCN webpage is known to me through another course called LSM4262 Tropical Conservation Biology by Dr Mary Rose Posa (Mingko) that I have taken in Semester 2 of NUS Academic Year 2012/2013.
- Resources from “The Singapore Red Data Book” by Davison, Ng, & Ho (2008) is gathered from “http://infopedia.nl.sg/articles/SIP_1472_2009-02-26.html”
- The information of the subspecies available at “http://www.theprimata.com/presbytis_femoralis.html” is ignored due to the information being outdated as the banded leaf monkey is at present considered to have only 3 subspecies as compared to the 5 subspecies listed on the website under different names.
- The references such as Aimi & Bakar (1992), Oates & Davies (1994), Pitra et al. (1995), and Bennett (1983) was obtained from “http://www.theprimata.com/presbytis_femoralis.html”, in which I was able to download Aimi & Bakar (1992) from <http://link.springer.com/article/10.1007/BF02382749> by using the National University of Singapore (NUS) library’s proxy. Diagnosis key and information was extracted from Aimi & Bakar (1992) for “taxopres”.
- I also happened to know that NParks (Singapore National Parks) and the Raffles Museum of Biodiversity Research (RMBR) has kept a species page of Singapore which I use to mine the general info on the banded leaf monkey of Singapore for “taxopres”.
 - <https://florafaunaweb.nparks.gov.sg/Special-Pages/animal-detail.aspx?id=224>
 - <http://rmbbr.nus.edu.sg/dna/organisms/listing/20/1/481/1>
 - <http://rmbbr.nus.edu.sg/dna/organisms/listing/20/1/464/1>
- Throughout the course of LSM4254 by Prof Meier, I was also introduced to the Encyclopedia of Life website (eol.org) and Biodiversity Heritage Library website (biodiversitylibrary.org), especially during the Exercise on Nomenclature on the 12th September 2013. However, searching for "*Presbytis femoralis*" on the Biodiversity Heritage Library do not give any useful results except general reviews on the Primates order.
- A search on Google Scholar (<http://scholar.google.com>) using the term “Banded Leaf Monkey” did not result in papers relevant to “taxopres”, however, using the term “*Presbytis femoralis*”, a very important review paper by Miller (1934) titled “The

langurs of the *Presbytis femoralis* group” is uncovered. This paper provided technical information for *Presbytis femoralis* such as the etymology of the femoralis epithet, synonyms history, type locality, and descriptions/diagnosis of the *Presbytis femoralis*. This paper is downloaded from “<http://www.jstor.org/discover/10.2307/1373983?uid=3738992&uid=2&uid=4&sid=21102958511067>” using the NUS library’s proxy.

- I’ve been told about Zootaxa (<http://www.mapress.com/zootaxa/taxa/> (a major journal for zoological taxonomists)) from the LSM4254 lecture and tried searching for articles on the banded leaf monkey using the terms such as "presbytis" and "Semnopithecus", however, there wasn't any luck. The only paper found in Zootaxa under this term is related to type information of the *Presbytis thomasi*, another species of langur in the Presbytis genus.
- Whenever a journal webpage such as Wiley Online Library has the option to view the article "Cited By" to trace what other articles have cited that particular paper, that option is then utilized as well.
- After determining that the most recent and updated research about the banded leaf monkey in Singapore was done by Andie Ang and documented in her master’s thesis (2010), I’ve downloaded her master’s thesis (Banded leaf monkeys in Singapore: Preliminary data on taxonomy, feeding, ecology, reproduction and population size) from NUS ScholarBank (<http://scholarbank.nus.edu.sg/>).
- After which most of the finer details, missing links, and refinement to the previous information such as phylogeny, behaviour, diet, physiology, and conservation data are added to “taxopres” based on Andie’s research papers.
- Related papers from the papers cited in Andie Ang’s Master’s Thesis is copied and searched for using Google and if available is downloaded using NUS Library’s proxy. Information from these papers/journal articles/books are skimmed through to see if there are any more suitable information that could be use for “taxopres”.
- A search on Google using the term “Andie Ang” revealed more information and multimedia for “taxopres”. More pictures and videos (<http://www.youtube.com/user/andieANG/videos>) of the banded leaf monkey in Singapore are obtained from Andie Ang and used for “taxopres” after I have gotten the permission from her. Her contact information “andie_ang@hotmail.com” is obtained from her online CV at “<http://evolution.science.nus.edu.sg/files/AngHF-CV1.pdf>”.
- Andie’s online CV and her webpage at “<http://www.andieang.org/about>” revealed further literatures on the banded leaf monkey of Singapore, i.e., Ang et al. (2012) and

Ang et al. (2010), retrieved from “<http://rmbn.nus.edu.sg/rbz/biblio/60/60rbz589-594.pdf>” and “<http://rmbn.nus.edu.sg/rbz/biblio/58/58rbz411-415.pdf>” respectively. It also revealed a 18 minutes video of her talk at TED X NUS 2011 and this video brought to me information on the comparison of the banded leaf monkeys with the common long-tailed macaques that Singaporeans are familiar with.

- Information for the Type section in “taxopres” is obtained through personal communication with Prof Rudolf Meier from the Department of Biological Sciences, NUS. Prof Meier informed me that most of the specimens collected during the colonial times in Singapore is found in the National History Museum of London. Hence, I went to the Zoology Collection Database of the National History Museum of London’s official webpage, and true enough, the syntype of *Presbytis femoralis* collected by Raffles was deposited there. The information was retrieved online over here: http://www.nhm.ac.uk/research-curation/scientific-resources/collections/zoological-collections/zoology-specimen-database//?action=display&irn=3486270&EntIdeScientificNameLocal_tab=presbytis+femoralis&RecordsPerPage=10&page=2&startAt=1&tab=determination#tabs
- Prof Meier has also pointed out to me through a personal communication after the LSM4254 lecture (in NUS LS Lab 5 Blk S1A Level 4) that *Presbytis femoralis* was previously grouped as a subspecies of *Presbytis melalophos*.
- A very useful open source textbook known as Wikibook.org is utilized as well. The search term “Presbytis” revealed a the book “Applied Ecology/Case Studies/Asian Rainforest Politics” which has information of the banded leaf monkey in Malaysian rainforest. With my knowledge of Singaporean rainforest, a comparison is drawn and integrated into “taxopres” under the Habitat section and other relevant section such as the Behaviour section.
- Specific information such as human digestibility of cellulose to complement the “Diet” section and for drawing a comparison with the banded leaf monkey ruminant-like stomach are searched for in Google using terms such as “Human digestibility of cellulose”, and this revealed Wikipedia page on Cellulose that has cited the papers: “Digestibility of dietary fiber components in vegetarian men” and “Neutral detergent fiber, hemicellulose and cellulose digestibility in human subjects”. These papers which are downloaded at “<http://link.springer.com/article/10.1007%2FBF01089198>” and “<http://www.ncbi.nlm.nih.gov/pubmed/6257867>” respectively by using NUS library’s proxy are skimmed through for any relevant information for “taxopres”.
- A search in Youtube (youtube.com) using the term “Banded Leaf Monkey” linked me to videos about the campaign which I personally chanced upon in NUS in 2011, titled “BL-UHM/ Save the Banded Leaf Monkey”. These videos are then embedded onto “taxopres”. Through these videos, I’ve also gotten links to their Facebook page at

“www.facebook.com/SaveTheBLM” which contains a lot of other discussions (unsupported by references/literature, hence, not included in “taxopres”) regarding the banded leaf monkeys.

- Books in the NUS libraries are searched for using the NUS library’s search engine (<http://linc.nus.edu.sg>). Terms such as “Old World Monkeys” (Monkeys would be too general a term and revealed a lot of irrelevant resources such as the “Monkey King fable tales”), “colobine”, “Asian colobines”, and “Primates” are used. These are some of the books found and that have provided relevant information (information within the books are navigated through the Glossary section if available) for “taxopres” whether regarding the Primates order in general or specifically on *Presbytis femoralis* or *Presbytis melalophos* (as *Presbytis femoralis* was previously grouped as a subspecies of *Presbytis melalophos*; this info is known through a personal communication with Prof Meier) :-
 - Old world monkeys: evolution, systematics, and behavior ; proceedings . Edited by J. R. Napier and P. H. Napier.
 - Primate taxonomy / Colin Groves.
 - Primates in perspective / edited by Christina J. Campbell ... [et al.]
 - A handbook of living primates: morphology, ecology and behaviour of nonhuman primates , by J. R. Napier and P. H. Napier.
 - Colobine monkeys : their ecology, behaviour, and evolution / edited by A. Glyn Davies, John F. Oates.
 - Primate adaptation and evolution / John G. Fleagle.
- Terminology history and descriptive information for the “Etymology” section are researched using my personal copy of the Concise Oxford English Dictionary, 11th Edition and the Merriam-Webster Online Dictionary.
- Genbank records was searched for using the term "*Presbytis femoralis*" with the NCBI search engine (<http://www.ncbi.nlm.nih.gov/>) but only the gene for the immunoglobulin alpha heavy chain is available online at GenBank that comes with the publication by Sumiyama,K., Saitou,N. and Ueda,S. (2009). This protein gene is not as useful as a barcode for *Presbytis femoralis* as protein genes are highly conserved and hence, even BLAST-ing the gene in GenBank revealed 100% similarity with other *Presbytis* spp. and closely related genera like the *Colobus* (African Colobine) and even the *Macaca* (from another Subfamily Cercopithecinae, instead of Colobinae that *Presbytis femoralis* is part of).
- BOLDSYSTEMS (<http://www.boldsystems.org/>), heralded as newer and better than, and contain more DNA barcode data than GenBank was introduced to me during LSM4254 lecture's Exercise 3 (5th September 2013) by Prof Meier. BOLDSYSTEMS was searched using the term "*Presbytis femoralis*" but no result was obtained, and

hence, the term "*Presbytis*" is used instead, which gave the mitochondrial *Cytochrome Oxidase Subunit 1* (CO1) for *Presbytis melalophos*. This species of *Presbytis melalophos* is unlikely to be an older name for *Presbytis femoralis* because the data was contributed by Sterner et al (2006) (*Presbytis femoralis* was separated from *Presbytis melalophos* in 1977). Hence, the result from BOLDSYSTEMS is deemed irrelevant for "taxopres".

- The webpage was initially arranged in the order of "Taxonomy & Systematics => Ecology => Conservation" due to my personal preference of getting to know someone/something's name first before dwelling into their behaviour and other things. However, after a peer-reviewed feedback section, the webpage is restructured as "Description/Diagnosis => Ecology => Conservation => Taxonomy & Systematics" as the Taxonomy & Systematics section are deemed too technical. The "Description & Diagnosis" section are then separated from the "Taxonomy & Systematics" section and presented first in the order of information of "taxopres" because that is what general public would be looking out for when they visit a page about a species.
- An interactive Google Map (<https://maps.google.com>) that was embedded onto "taxopres" was generated and constantly updated as seen fit throughout the month of November, 2013.
- The illustration at the Conservation section done by me (Siow Jer Jian) is repainted at least 3 times in the span of 2 weeks to reflect a more accurate representation of the banded leaf monkeys.
- Learning how to use and finding out what works and what doesn't (such as adding Anchors) in the Wikispaces and some basic "html" coding is also very important in conceptualizing the webpage. This extends to searching for solutions online when things don't work out during the construction of the webpage such as alignment of media files, widgets, and certain inbuilt features.
- All in all, the majority of the scientific resources (which are deemed reputable, relevant, and most importantly, reliable) are gathered second-hand from Andie Ang's Master's Thesis which is to me, like a monograph of the banded leaf monkey in Singapore.
- I've also gathered information and updates, plus, clearing up some confusions and inconsistencies in the data (such as the fluctuating numbers of the species of plants consumed by the banded leaf monkeys and whether the white bands is only on the inner thigh or both the inner forelimbs and lower limbs) with Andie Ang herself (as she is currently the only contactable authoritative person with knowledge of the banded leaf monkeys in Singapore) through E-mail.