

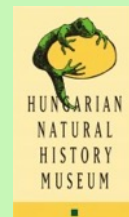
From Chirovox to chirovirus: The implication of open data in one health studies

Joe Chun-Chia Huang*, Tamás Görföl, Dorottya Györössy, Sándor Zsebők, Gábor Csorba, Tigga Kingston

GBIF Asia Regional Engagement meeting and Symposium,
Bangkok, Thailand, 2022/11/22,



Adrià López-Baucells (CC BY NC 4.0)



國立臺灣師範大學
National Taiwan Normal University

Bats play important roles in ecosystems



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BIOLOGICAL
REVIEWS

Cambridge
Philosophical Society

Biol. Rev. (2015), pp. 000–000.
doi: 10.1111/brv.12211

1

Bird and bat predation services in tropical forests and agroforestry landscapes

Bea Maas^{1,2,*}, Daniel S. Karp^{3,4}, Sara Bumrungsri⁵, Kevin Darras¹, David Gonthier^{3,6}, Joe C.-C. Huang^{7,8}, Catherine A. Lindell⁹, Josiah J. Maine¹⁰, Laia Mestre^{11,12,13}, Nicole L. Michel¹⁴, Emily B. Morrison⁹, Ivette Perfecto⁶, Stacy M. Philpott¹⁵, Çagan H. Şekercioğlu^{16,17}, Roberta M. Silva¹⁸, Peter J. Taylor^{19,20}, Teja Tschardt¹, Sunshine A. Van Bael^{21,22}, Christopher J. Whelan²³ and Kimberly Williams-Guillén^{6,24}

Maas et al 2015. *Biological Reviews*

Unequal viral reservoirs

Perspective


Lessons from the host defences of bats, a unique viral reservoir

<https://doi.org/10.1038/s41586-020-03128-0>

Received: 26 May 2020

Accepted: 3 December 2020

Published online: 20 January 2021

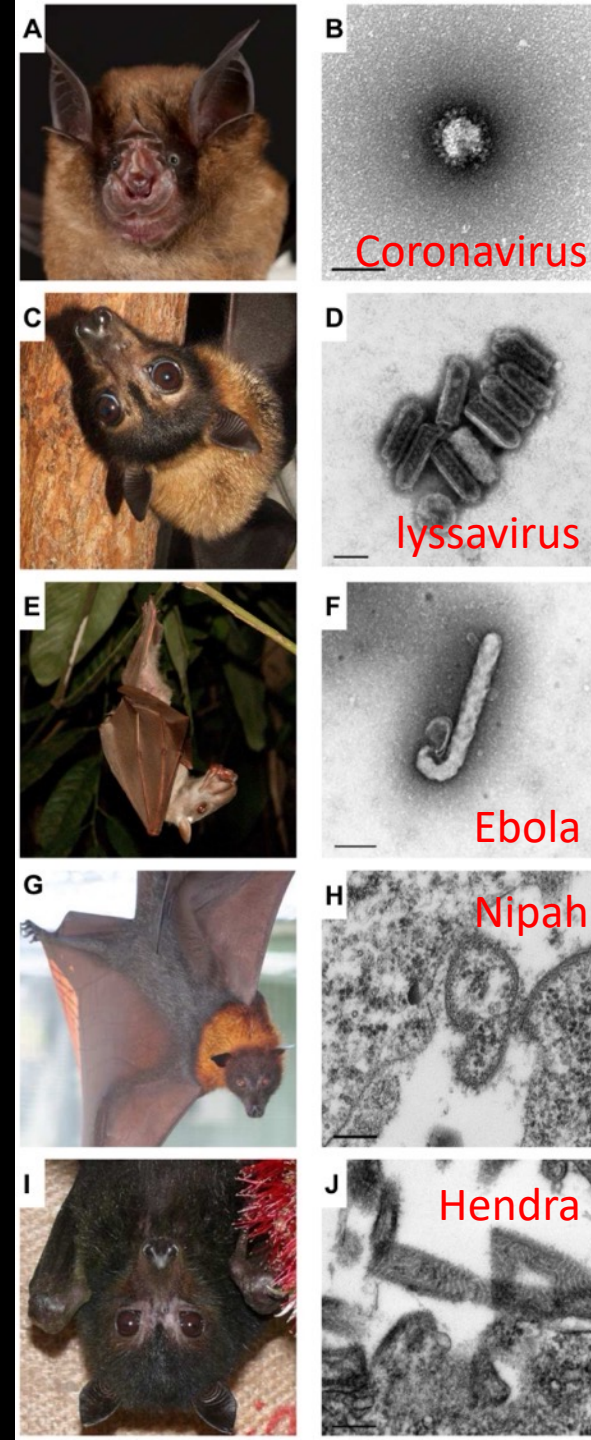
 Check for updates

Aaron T. Irving^{1,2,3,5}, Matae Ahn^{1,5}, Geraldine Goh^{1,5}, Danielle E. Anderson¹ & Lin-Fa Wang^{1,4}

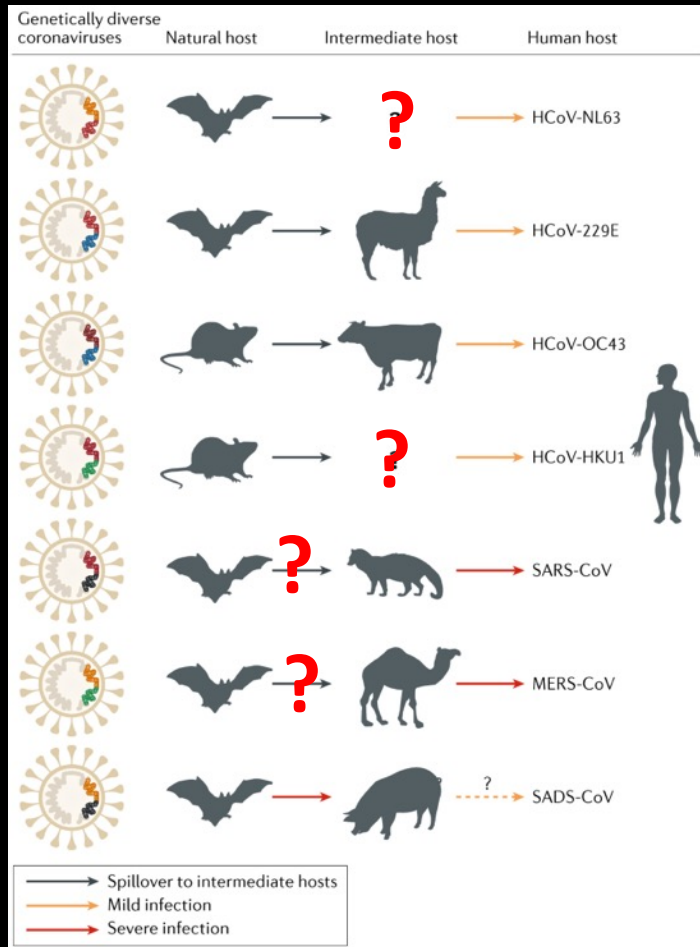
There have been several major outbreaks of emerging viral diseases, including Hendra, Nipah, Marburg and Ebola virus diseases, severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS)—as well as the current pandemic of coronavirus disease 2019 (COVID-19). Notably, all of these outbreaks have been linked to suspected zoonotic transmission of bat-borne viruses. Bats—the only flying mammal—display several additional features that are unique among mammals, such as a long lifespan relative to body size, a low rate of tumorigenesis and an exceptional ability to host viruses without presenting clinical disease. Here we discuss the mechanisms that underpin the host defence system and immune tolerance of bats, and their ramifications for human health and disease. Recent studies suggest that 64 million years of adaptive evolution have shaped the host defence system of bats to balance defence and tolerance, which has resulted in a unique ability to act as an ideal reservoir host for viruses. Lessons from the effective host defence of bats would help us to better understand viral evolution and to better predict, prevent and control future viral spillovers. Studying the mechanisms of

Irving et al. (2021)

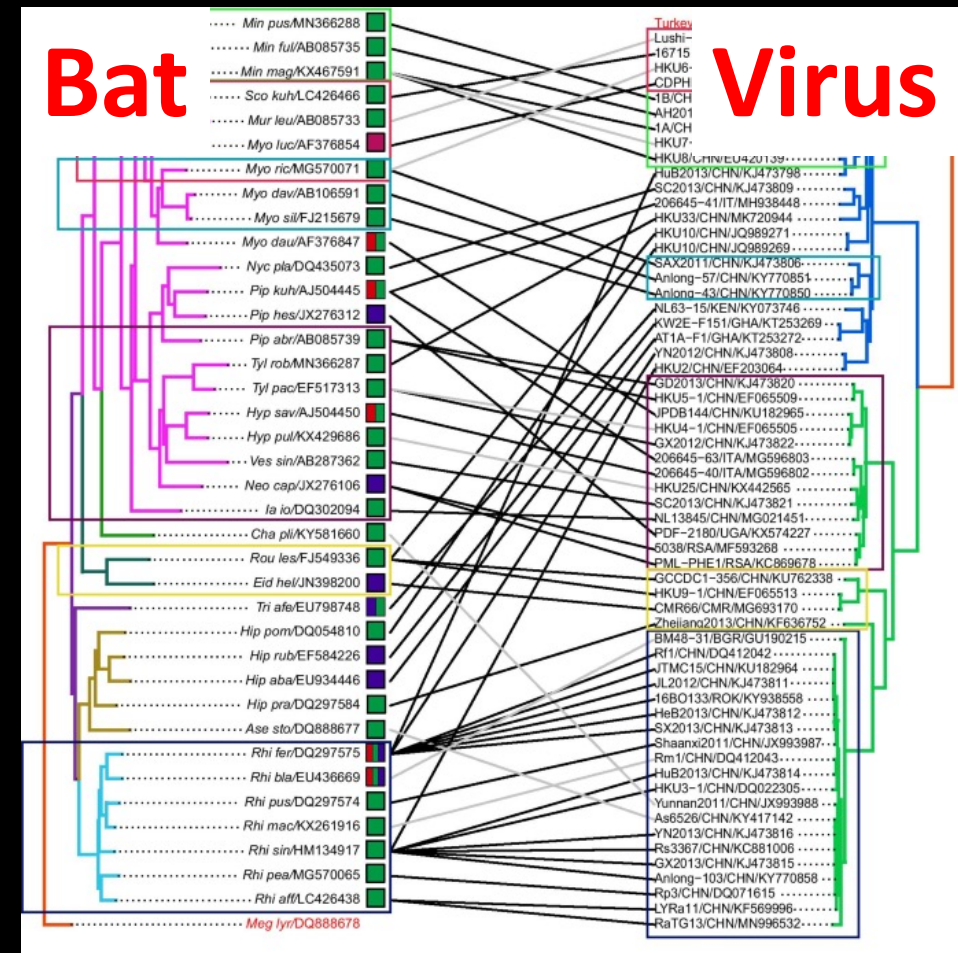
Wyanne and Wang (2013)



Stopping spillover requires understanding of interactions between virus, host and environment

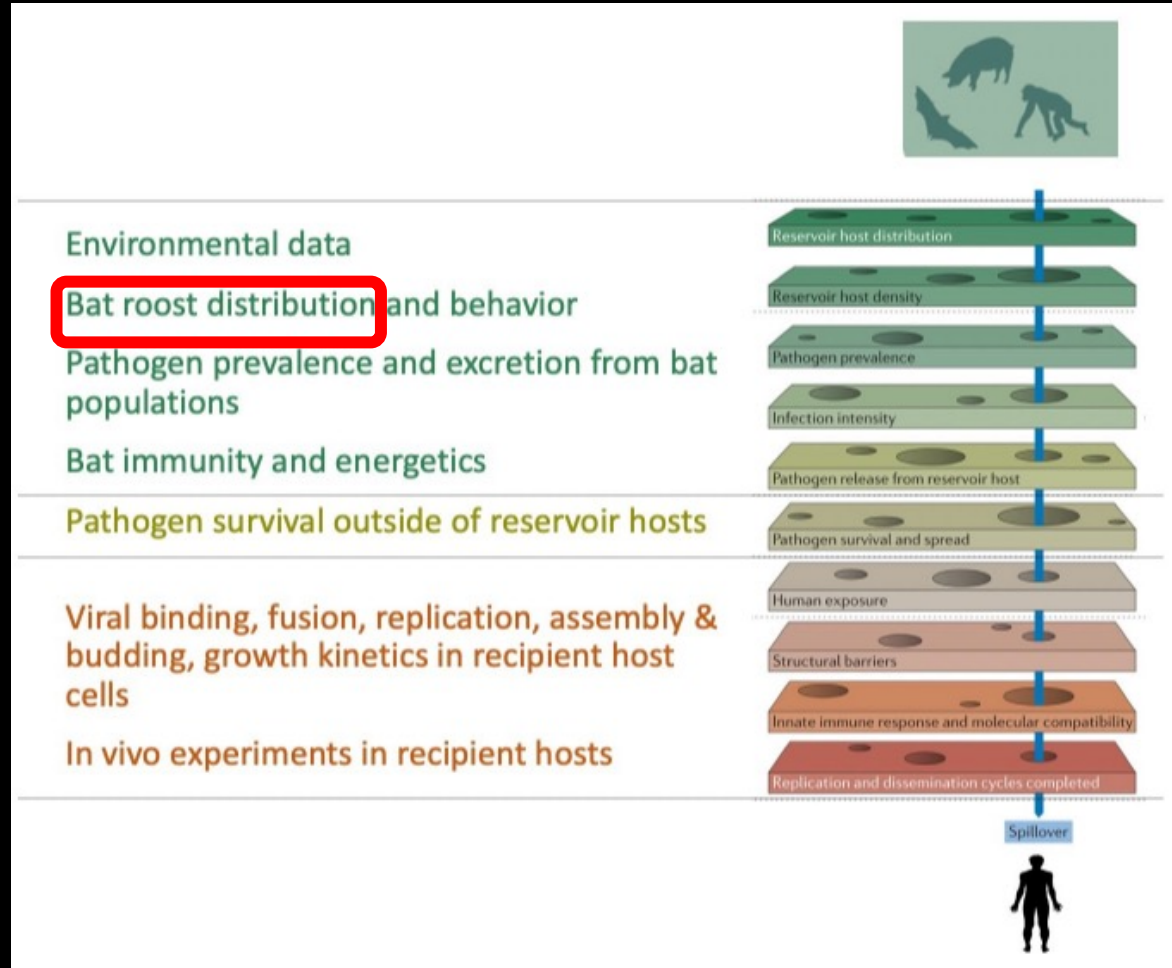


Modified from Chi et al. 2018. *Nature*

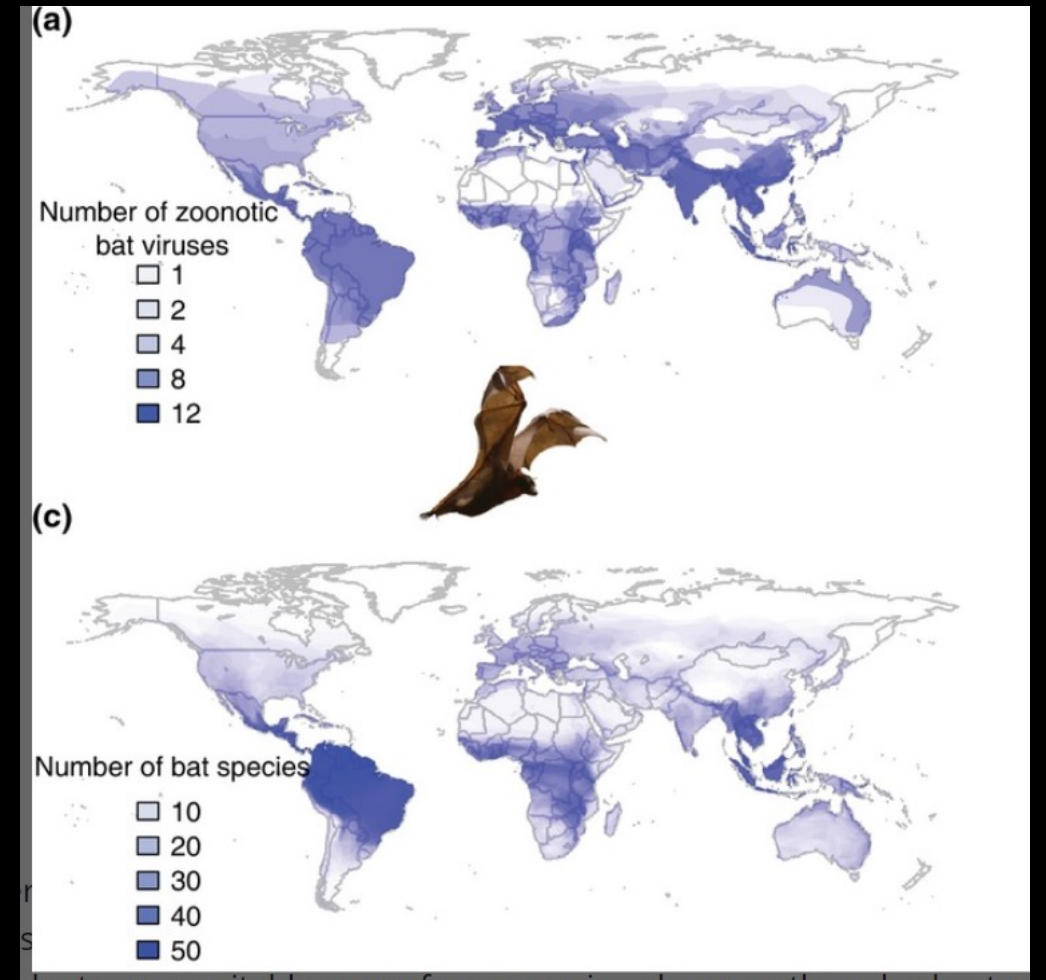


Modified from Liang et al. 2021. *Sustainability*

Host occurrence data are essential

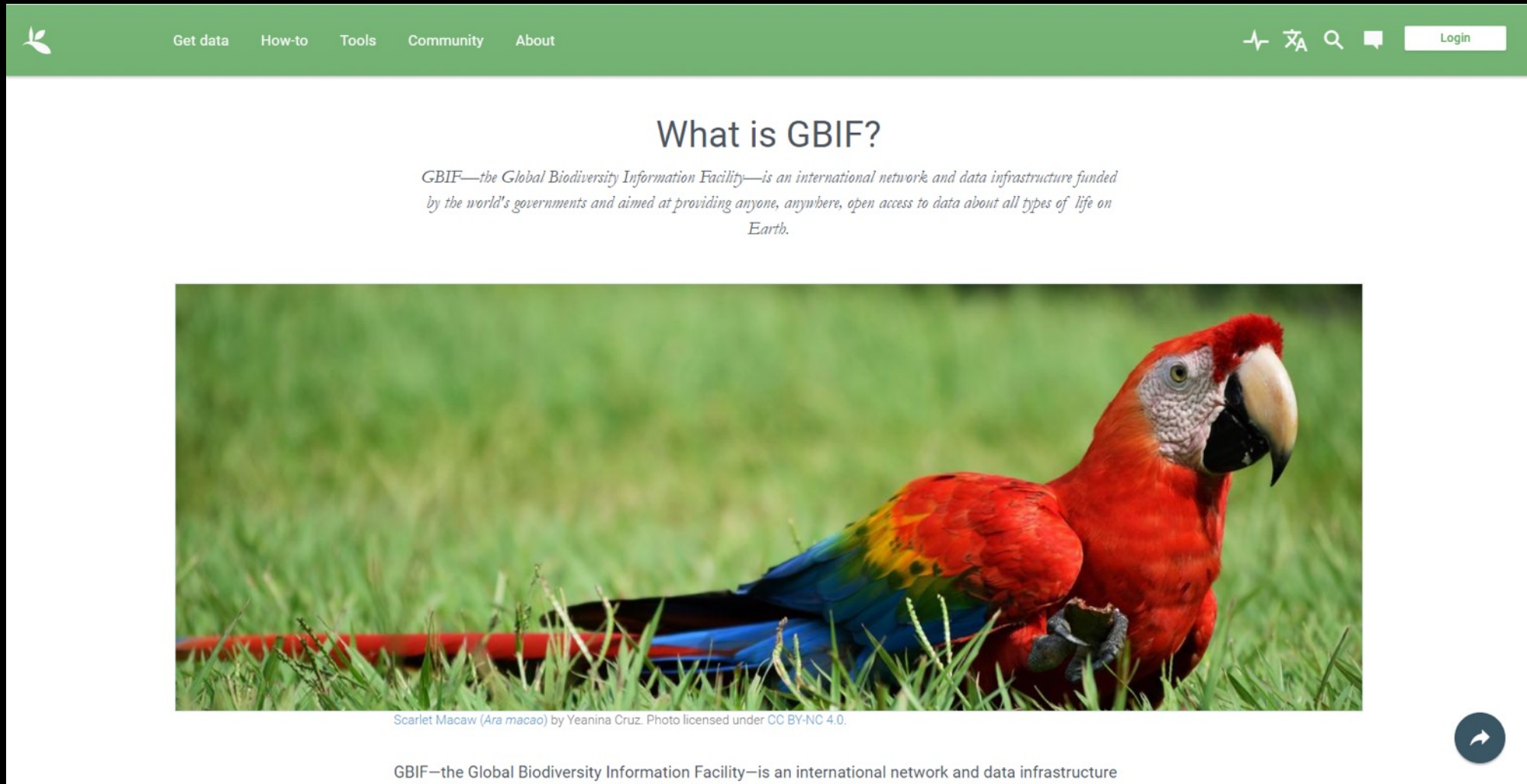


Source: <https://batonehealth.org/>



Modified from Luis et al. 2015. *Ecology Letters*

But where can we get data?




The image shows a screenshot of the GBIF website homepage. At the top, there is a green navigation bar with a logo on the left and links for "Get data", "How-to", "Tools", "Community", and "About" in the center. On the right side of the bar are icons for a heart, a magnifying glass, a speech bubble, and a "Login" button. Below the navigation bar, the main content area has a white background. The title "What is GBIF?" is centered in a large, bold, black font. Below the title is a paragraph of text in italics: "GBIF—the Global Biodiversity Information Facility—is an international network and data infrastructure funded by the world's governments and aimed at providing anyone, anywhere, open access to data about all types of life on Earth." Below this text is a large, vibrant photograph of a Scarlet Macaw (Ara macao) perched on green grass. The macaw has bright red feathers, a blue and yellow wing, and a large, curved beak. At the bottom of the page, there is a small blue circular icon with a white arrow pointing right. Below the image, there is a small caption: "Scarlet Macaw (*Ara macao*) by Yeanina Cruz. Photo licensed under CC BY-NC 4.0." At the very bottom of the page, there is a line of text: "GBIF—the Global Biodiversity Information Facility—is an international network and data infrastructure".

Get data How-to Tools Community About

Login

What is GBIF?

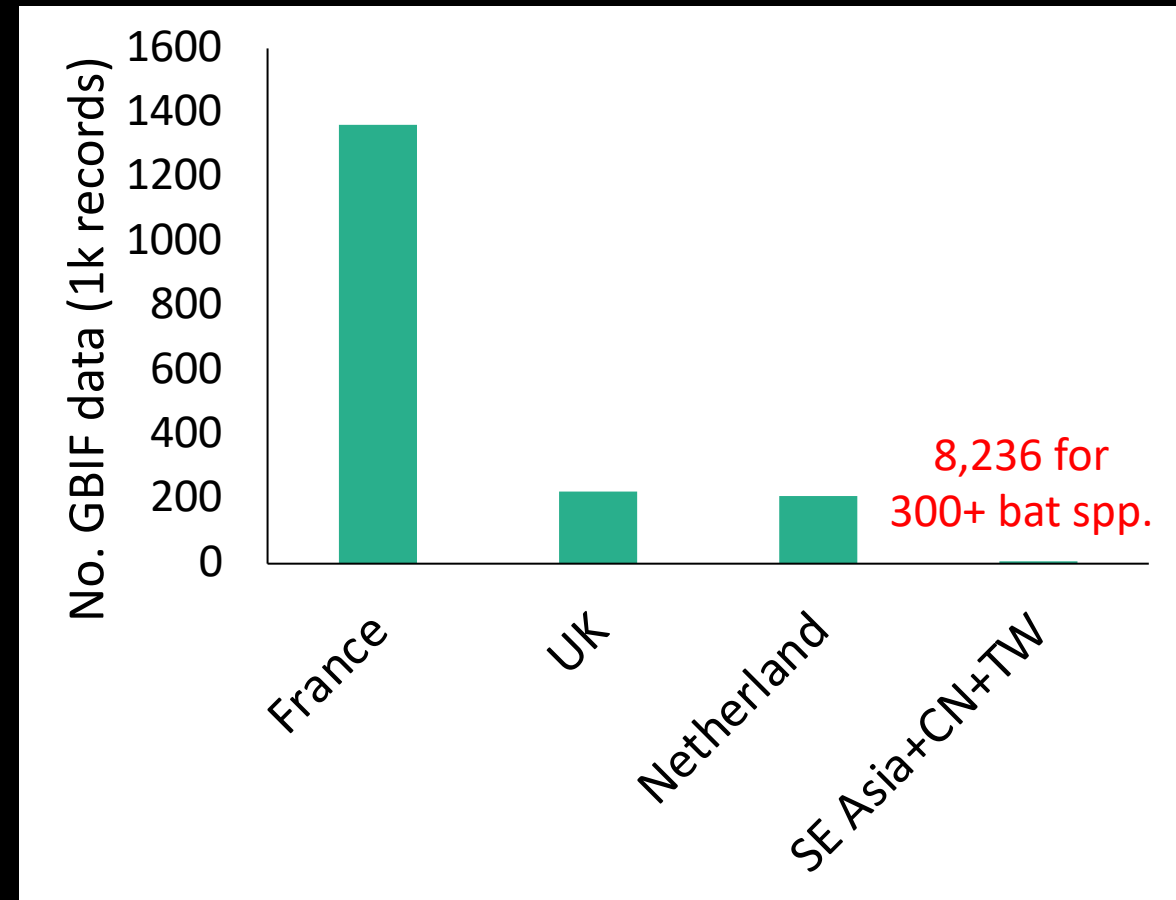
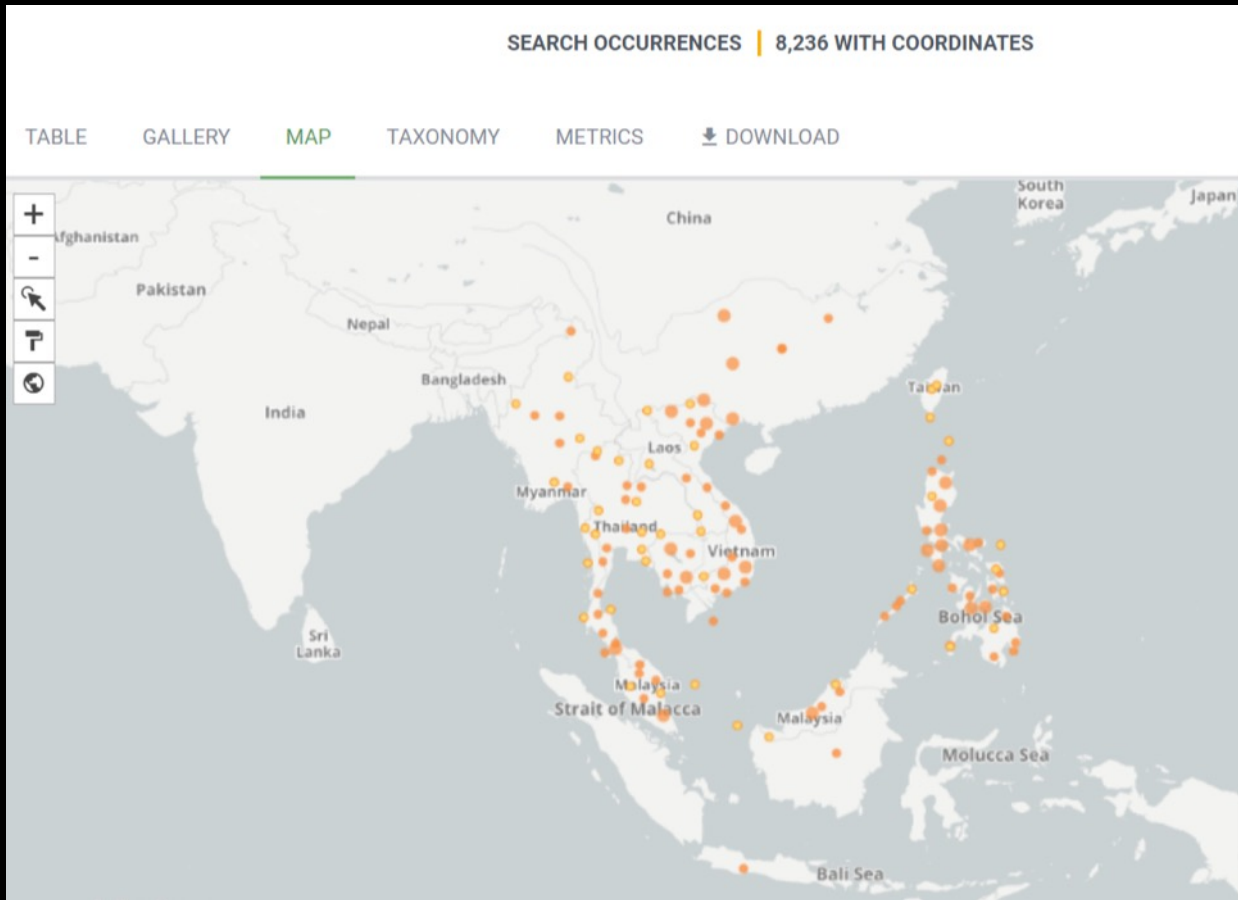
GBIF—the Global Biodiversity Information Facility—is an international network and data infrastructure funded by the world's governments and aimed at providing anyone, anywhere, open access to data about all types of life on Earth.



Scarlet Macaw (*Ara macao*) by Yeanina Cruz. Photo licensed under CC BY-NC 4.0.

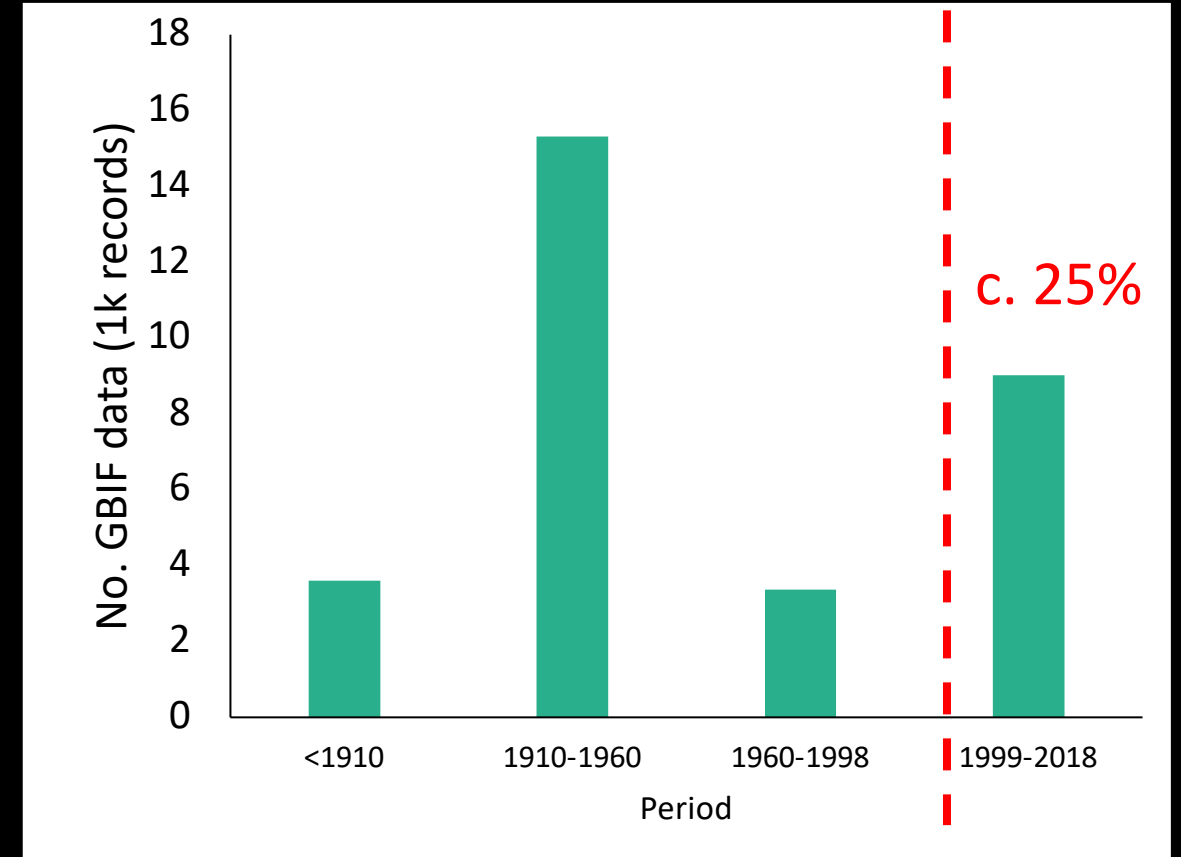
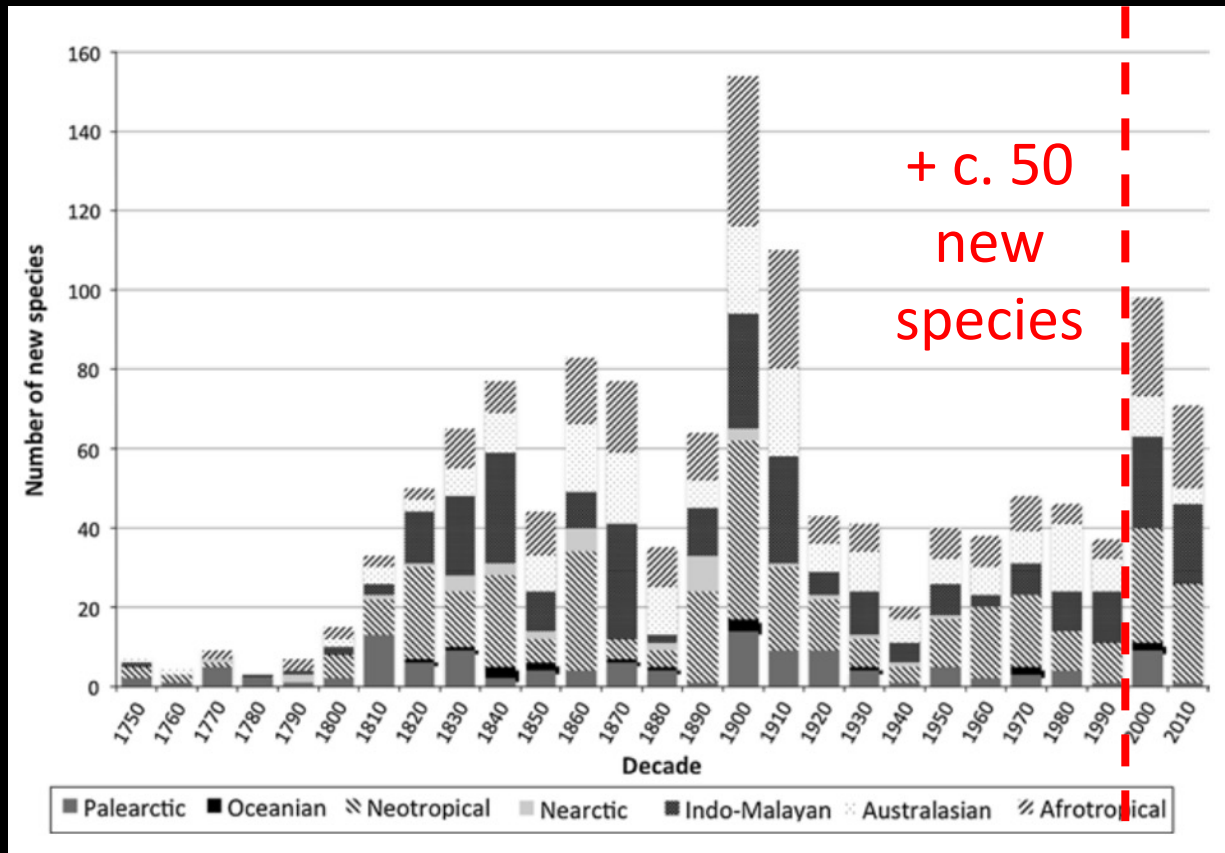
GBIF—the Global Biodiversity Information Facility—is an international network and data infrastructure

Wallacean shortfall of GBIF's bat data from Asia



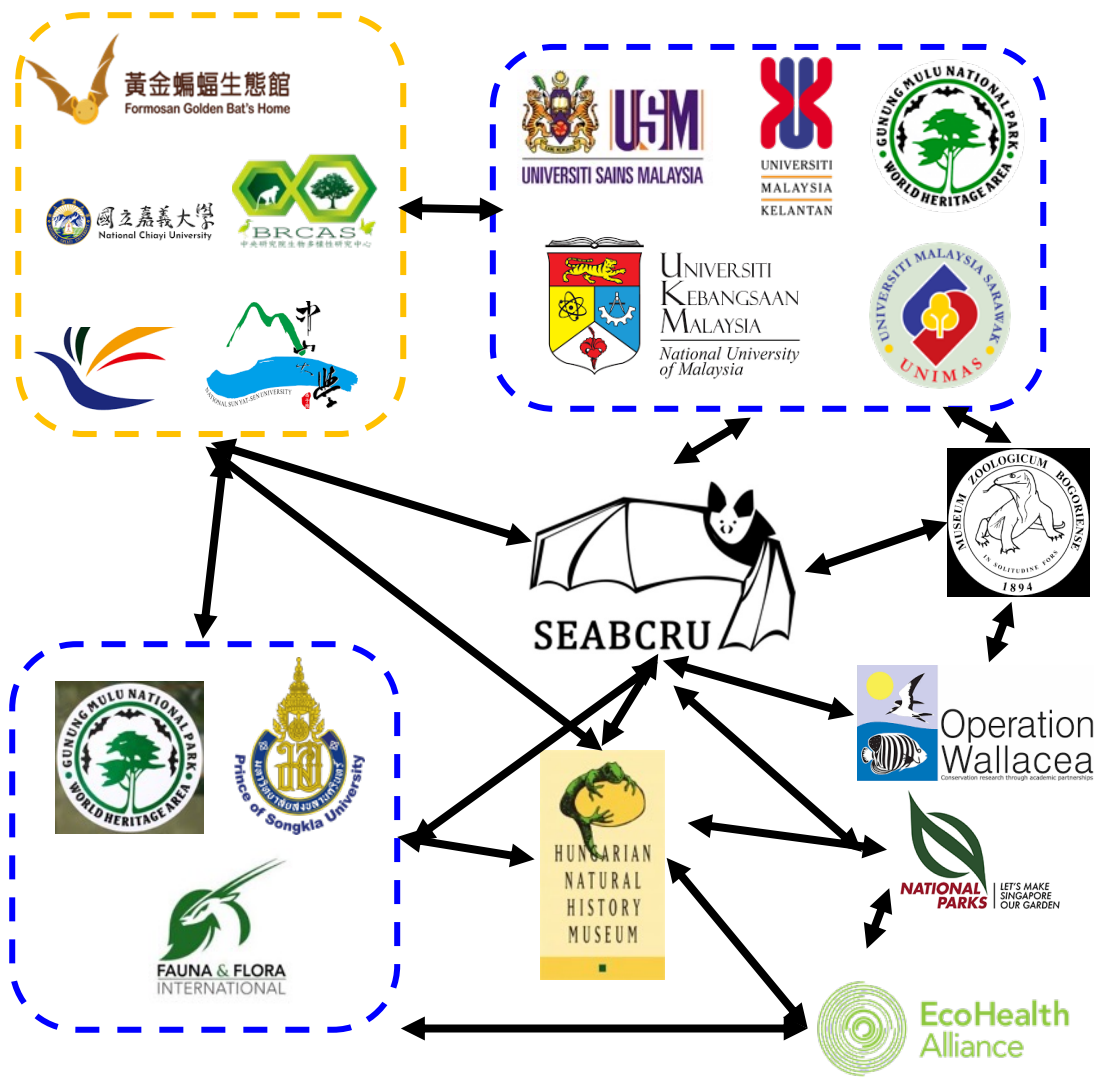
Occurrence data of echolocating bats from 1999-2018 in GBIF

Linnean shortfall of GBIF's Asian bat data



Tsang et al. 2016. (Data updated to 2014)

Source: <https://www.gbif.org/>



PROJECT | IN PROGRESS

Deploying acoustic data to fill gaps in bat biodiversity information for Southeast Asia

1 May 2019 - 30 Apr 2020 € 14,838

ABOUT NEWS & EVENTS

Indian Barbastelle (*Barbastella darjelingensis*) from Mefeng, Taiwan. Photo by Joe Chun-Chia Huang (CC BY-NC 4.0)



Tigga Kingston
(SEABCRU)



Gabor Csorba
(HNHM)



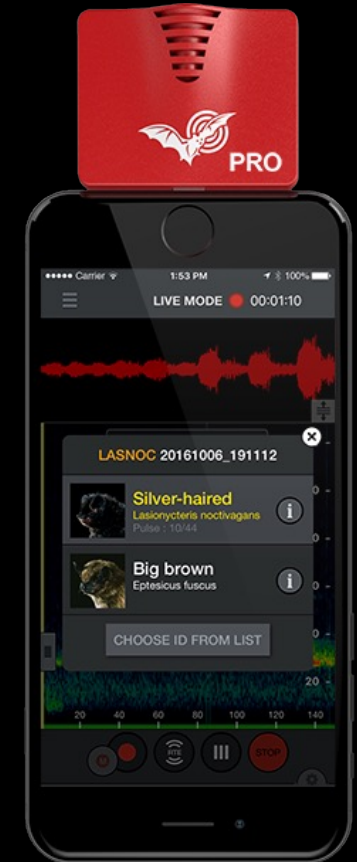
Tamas Golfol
(HNHM)



project page

Acoustics techniques as effective tools for monitoring and survey bats

Fawn leaf-nosed bat (*Hipposideros cervinus*)



Project architecture



Formatting

- DwC
- GUANO

- CC licenses
- Unique identifier
- ABCD sharing policy
- SEBACRU policy



Asian Bat Call Database (ABDC)

- Species occurrence data attached with reference recordings of bat calls



SEBACRU database

- 40k clean data from literatures, museums & GBIF
- 2,000-2,500 new data from ABCD



2019 July, Phuket, Thailand

IBRC data quality control workshop
(<https://ibrc2019.com/draft-schedule/>)



2019, August, Hat Yai, Thailand

Join workshop with Asian Soundscape Project



2019 December, Bangi, Malaysia

Main workshop on data assembling



2020 April, virtual

Webinar training on data assembling

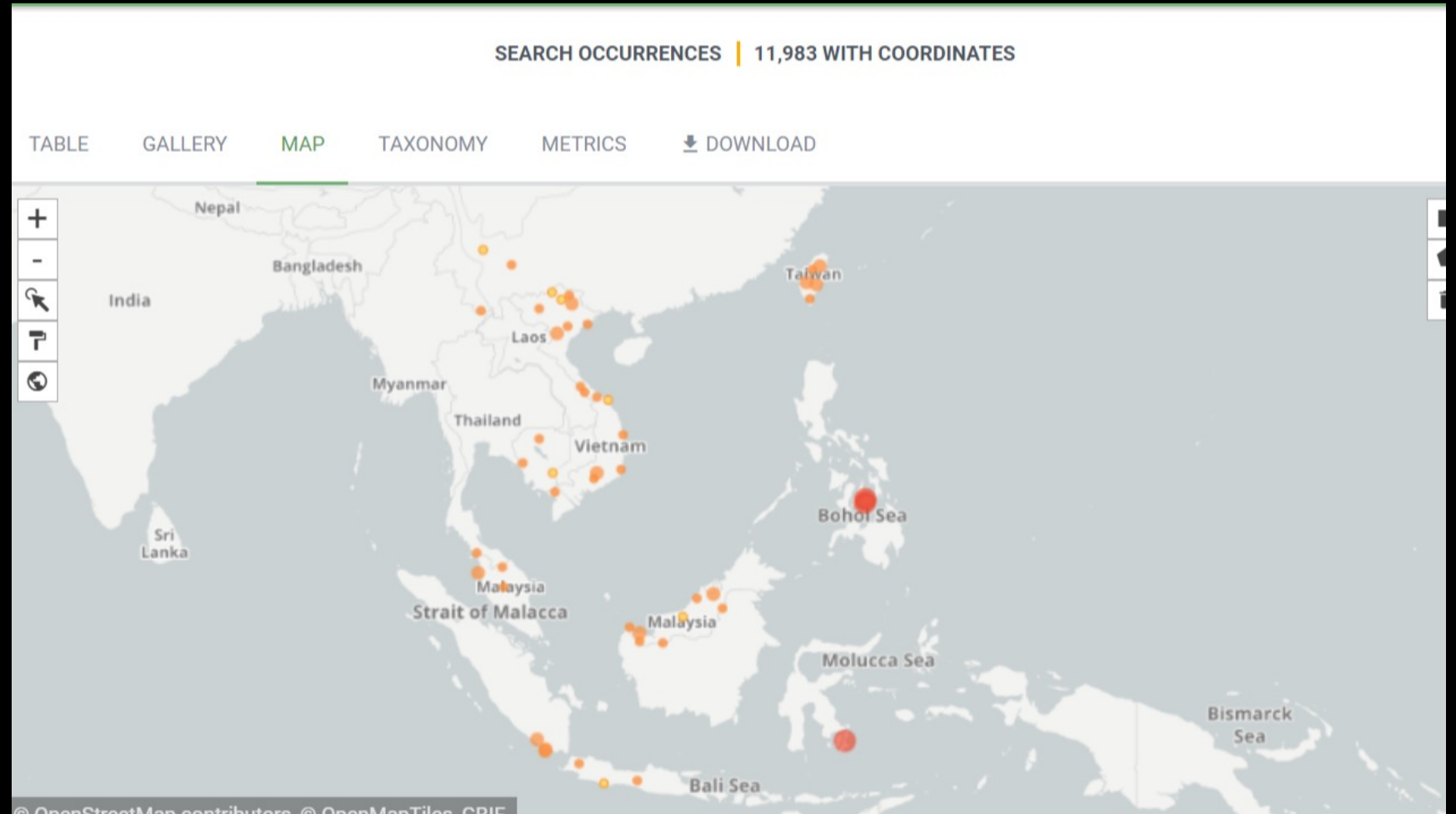


Achievements




Project summary

- > 19,000 species data (by 2022)
- 12,000 with coordinates (145% to GBIF data for 1999-2018 period)
- Fill geographic gaps, particularly Taiwan, part of Indonesia



ChiroVox-the largest public bat call database



The screenshot shows the ChiroVox website homepage. At the top, the logo "ChiroVox" is in green, with "The bat call library" below it. A navigation menu includes "Home", "About", and "Sound library". A "Welcome on our site!" section contains a paragraph about the website's purpose and a small image of a bat in flight. Below this is a "NEWS" section with two entries: one dated 13.01.2022 about a publication in PeerJ, and another dated 12.01.2022 about database corrections. At the bottom, there is a call to action to check the "Contribution section" for more information.

ChiroVox
The bat call library

[Home](#) [About](#) [Sound library](#)

Welcome on our site!

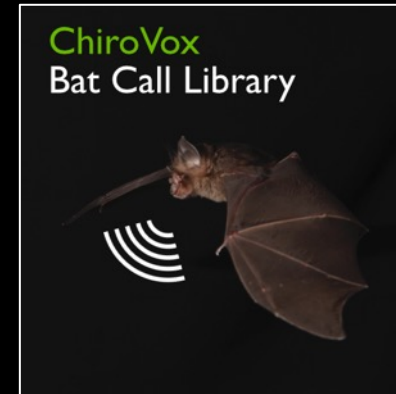
Welcome to the ChiroVox website, the home of bat recordings from all over the world! The site is intended to facilitate work with bat sounds and is based on the Asian Bat Call Database, an initiative of the Hungarian Natural History Museum (HNHM) and the Southeast Asian Bat Conservation Research Unit (SEABCRU).

NEWS

13.01.2022 - We are happy to announce that an article about the portal has been published in PeerJ. Thank you all the co-authors, reviewers and editor who made this possible! Please check our Facebook page and Twitter account as well!

12.01.2022 - The database was reviewed and corrected. The beta testing is over. If you find any errors or have any suggestions, please feel free to contact us at contact@chirovox.org.

If you would like to contribute, please check the [Contribution section](#) for further information!



ChiroVox website

- >3,900 recordings of c. 200 bat species from 9 countries by 21 research teams
- More will come soon

The applications of BIFA outputs – species distributions



Preprints are preliminary reports that have not undergone peer review. They should not be considered conclusive, used to inform clinical practice, or referenced by the media as validated information.

The Evolutionary History and Ancestral Biogeographic Range Estimation of Old-world Rhinolophidae and Hipposideridae (Chiroptera)

Ada - Chomelia (✉ chomeliaa@gmail.com)

Xishuangbanna Tropical Botanical Garden <https://orcid.org/0000-0002-8541-5947>

Alice Catherine Hughes

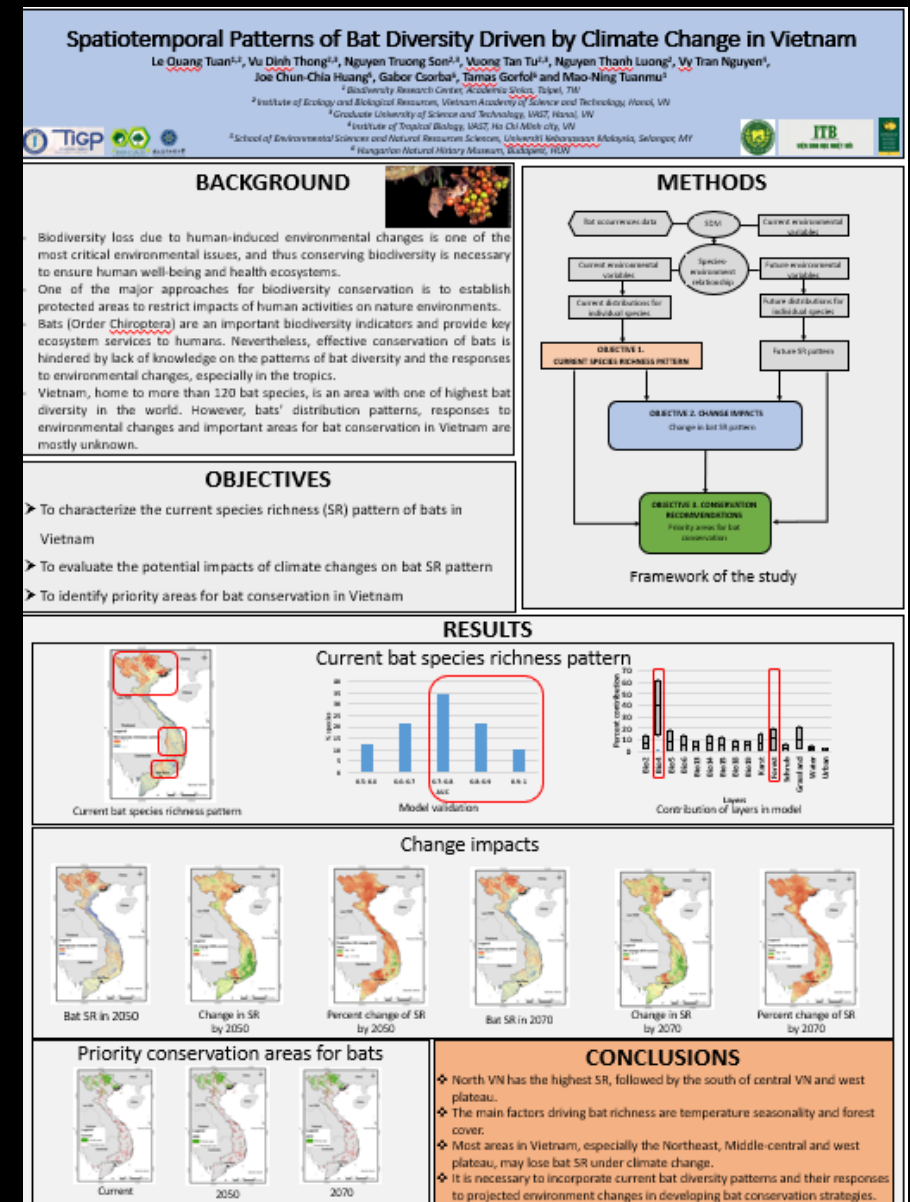
Global Ecology and Biogeography

A Journal of Macroecology

RESEARCH ARTICLE | Full Access

How well do species distribution models predict occurrences in exotic ranges?

Dat Nguyen ✉ Brian Leung



The applications of BIFA outputs - bioacoustics



ORIGINAL ARTICLE

Towards a regional call library: Classifying calls of a species-rich bat assemblage in a Bornean karst rainforest

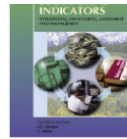
Ellen McArthur^{1,2,*}, Faisal Ali Anwarali Khan^{1,*}



Contents lists available at [ScienceDirect](#)

Ecological Indicators

journal homepage: www.elsevier.com/locate/ecolind



A machine learning framework to classify Southeast Asian echolocating bats

Natalie Yoh^{a,*}, Tigga Kingston^{b,c}, Ellen McArthur^d, Oliver E. Ayles^e, Joe Chun-Chia Huang^f, Emy Ritta Jinggong^d, Faisal Ali Anwarali Khan^d, Benjamin P.Y.H. Lee^g, Simon L. Mitchell^a, Jake E. Bicknell^a, Matthew J. Struebig^a

Mammal Research
<https://doi.org/10.1007/s13364-021-00570-x>

REVIEW ARTICLE



Bat echolocation in continental China: a systematic review and first acoustic identification key for the country

David López-Bosch^{1,2} • Joe Chun-Chia Huang³ • Yanping Wang⁴ • Ana Filipa Palmeirim^{2,5} • Luke Gibson² • Adrià López-Baucells¹

The applications of BIFA outputs – One Health

nature
COMMUNICATIONS

ARTICLE 

<https://doi.org/10.1038/s41467-022-31860-w> OPEN

A strategy to assess spillover risk of bat SARS-related coronaviruses in Southeast Asia

Cecilia A. Sánchez ¹, Hongying Li ¹, Kendra L. Phelps ¹, Carlos Zambrana-Torrel ², Lin-Fa Wang ³, Peng Zhou⁴, Zheng-Li Shi ⁴, Kevin J. Olival ¹ & Peter Daszak ¹✉

Cell

Volume 184, Issue 17, 19 August 2021, Pages 4380

Article

Identification of novel bat coronaviruses sheds light on the evolutionary origins of SARS-CoV-2 and related viruses

Hong Zhou ^{1,9}, Jingkai Ji ^{1,9}, Xing Chen ^{2,9}, Yuhai Bi ^{3,9}, Juan Li ¹, Qihui Wang ³, Tao Hu ¹, Hao Song ⁴, Runchu Zhao ^{3,5}, Yanhua Chen ², Mingxue Cui ¹, Yanyan Zhang ¹, Alice C. Hughes ^{2,6} ⁶ ✉, Edward C. Holmes ⁷ ⁷ ✉, Weifeng Shi ^{1,8,10} ¹⁰ ✉

One Health

Volume 13, December 2021, 100299



ELSEVIER

Low mammalian species richness is associated with Kyasanur Forest disease outbreak risk in deforested landscapes in the Western Ghats, India

Michael G. Walsh ^{a, b, c, d} ^a ✉, Rashmi Bhat ^{c, d}, Venkatesh Nagarajan-Radha ^e, Prakash Narayanan ^{c, d}, Navya Vyas ^{c, d}, Shailendra Sawleshwarkar ^{c, d, f}, Chiranjay Mukhopadhyay ^{g, h}

In three nutshell

- Our project provides a case showing:
 1. Networks that connect local and international researchers may breakdown barriers of data sharing.
 2. Open data could facilitate the development of science, even that data shared are in small amount.
 3. When you share research data to the publics, you also open a gate to a better life and many possibilities for human being, including yourself and people you care about.





Email: joechunchiahuang@ntnu.edu.tw

Twitter: [@EcojoeHuang](https://twitter.com/EcojoeHuang)

Thank you

Hipposideros lekaguli, Philippines
Joe Chun-Chia Huang (CC BY-NC 4.0)