World Congress of Herpetology Newsletter

June 2023, Volume 4, Issue 1

ISSN 2708-597X

www.worldcongressofherpetology.org

Letter from the Editor

Judit Vörös

Soon we'll enter the final year of preparations for our upcoming WCH10 congress in the captivating city of Kuching, Sarawak, Malaysia. The organization of the congress is well underway and is moving forward at full speed. One major milestone that I would like to highlight is the launch of our congress website at 2024wch10.com. While the scientific programme, speakers and student grants will be announced closer to the date, I encourage you all to visit the website, check out the details so far, and dream about this exciting event.

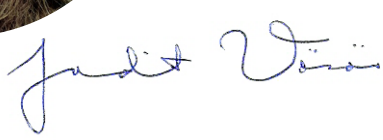
In this issue of the newsletter, we establish a connection to the upcoming congress through a series of notable announcements. These include the *Call for Symposia*, the *Call for Bids to Host WCH11 in 2028*, and the *Call for Nominations for Membership of the Executive and International Herpetological Committees of WCH*. Seize this remarkable opportunity to actively participate in shaping WCH10 and the future of our organization!

Following the calls for action in this newsletter, we explore how Mona Abdul Manap, CEO of Place Borneo - a Professional Conference Organiser company based in Kuching – established contact with Professor Neil Das, resulting in a fruitful collaboration to organize WCH10. We also continue our journey of discovery of Borneo through Alexander Haas and Neil Das sharing their big field adventure to catalogue the tadpoles of Borneo.

For this issue, I also was inspired after learning about the success of the FrogID app. So, I decided to contact leading scientist Jodi Rowley for an interview. I asked her to tell us how she created such a successful citizen science project and what her secret was to find balance between the many tasks she has professionally.

Lastly, in this issue, we finish our cycle through the seven WCH biogeographical regions, with the Oriental Region serving as our final destination. First, Professor Si-Min Lin, an esteemed evolutionary biologist from Taiwan, shares captivating insights into his field of expertise, interviewed by one of his close collaborator, Nick Poyarkov. Furthermore, we delve into the intriguing history of herpetology in Bhutan, a nation known as the happiest country in the world.

I wish you an exciting scientific journey until you hear from us via the next newsletter!



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On the cover

At a stream between agricultural lands looking for *Onychodactylus koreanus*, we were greeted by this wonderful species of Korean pit viper (*Gloydius ussuriensis*) hidden among a tiny rocky cascade. Although named after the Ussuri River from Russia and China, it can be found on the Korean mainland and on Jeju island as well. Photo: Kenneth Chin Y. A.

Call for Symposia

10th World Congress of Herpetology
Kuching, Sarawak, Borneo
5–9 August 2023

The Scientific Program Committee of the 10th World Congress of Herpetology invites proposals for symposia for the Congress, to be held 5–9 August 2024, in Kuching, Sarawak, Borneo.

Proposals must be submitted online by e-mail, and include a descriptive title, up to 200 words explaining the topic of the symposium and its importance, and a list of proposed speakers with their affiliations and the tentative titles of their presentations. Proposals that can demonstrate that speakers have been invited and have agreed to participate, and that the funds required to get speakers to Kuching are being solicited or have been obtained, will have higher likelihood of acceptance.

Proposed symposium topics should pay attention to the global nature of the meeting as a whole and preferably should not repeat those of recent World Congresses of Herpetology. WCH supports diversity and inclusivity in its broadest sense, and participation of young investigators and researchers from a variety of countries is encouraged.

Please note that 10WCH is being planned as a face-to-face Congress, as in the past. If online presentations, recorded presentations or a hybrid format is required for specific Symposia, then the venue (the Borneo Convention Centre Kuching) has an extra charge (currently, ca. $1,900 per room per day) and symposium organisers must state how they will meet this cost.

Symposium presentations may be 15 or 30 min in length. Symposia will ordinarily be restricted to half-day sessions comprised of, for example, 8–10 x 15 min talks or 4–5 30-min talks. Any introduction or discussion sessions must be accommodated within the available 15 min slots. Full-day symposia may be considered if sufficiently justified and if there is likely to be of sufficient interest.

Enquiries:

If you have any pre-submission enquiries concerning the scientific content or structure of the symposia please contact: Professor Richard A Griffiths, Durrell Institute of Conservation and Ecology, School of Anthropology and Conservation, Marlowe Building, University of Kent, Canterbury, CT2 7NR, UK. Email: **worldcongressofherpetology@gmail.com**

Deadline:

Please submit proposals no later than 30th September 2023.

The Scientific Program Committee of the 10th World Congress of Herpetology will review all symposium proposals prior to acceptance. Receipt of submissions will be confirmed by email. Notifications of acceptance or rejection of proposals will be issued by 31 October 2023. If the proposal is accepted, each symposium participant must personally register for the congress and submit an abstract of their presentation. Note that acceptance of a symposium proposal does not indicate that the 10th World Congress of Herpetology will provide funding of any kind for symposium organisers, chairs or speakers.

More information on the meeting is provided at the official website of the Congress at:

2024wch10.com

Format:

- Title of symposium (max 10 words): ...
- Proposer(s) of symposium (up to three proposers per symposium): Name, email, telephone of each.
- Full day or half day symposium?
- Description of symposium, including why it is topical and important for a global herpetological audience (max 200 words): List of proposed speakers (half day: up to 9 x 15 min slots; full day up to 18 x 15 min slots). For each proposed speaker please provide: Name
- Institutional affiliation
- Title of presentation
- Attendance at 10WCH in Kuching confirmed/unconfirmed
- All presentations are expected to be in-person at the Conference Centre Kuching. If you intend to host an online or hybrid symposium, please give details of how you will meet the charges for hosting this at the Conference Centre.
- Please give any details of any sponsorship or funding you have obtained or are seeking to provide travel expenses for speakers or support the symposium in any other way (max 100 words).
- Is this proposal intended to be included within the Global Amphibian and Reptile Disease (GARD) part of the Congress? Yes/No

Please email proposals to:

Prof. Indraneil Das
Institute of Biodiversity and Environmental Conservation
Universiti Malaysia Sarawak
94300 Kota Samarahan, Sarawak, Malaysia
Email: idas@unimas.my

Call for Bids

to host the 11th World Congress of Herpetology in 2028 are now open

Bids will be assessed on the quality of the proposal

Emphasis should be on ensuring the broadest representation amongst attendees, free exchange of research and conservation ideas and objectives, developing new collaborations and friendships and improving our collective ability to study amphibians and reptiles and conserve them and their habitats.

The following guidelines will be used by the WCH Executive Committee

- a suitable congress director & hosting institutions,
- a strong organising committee (including local & regional herpetologists),
- a strong scientific program committee (including local & regional herpetologists)
- economic feasibility & affordability,
- conference facilities & organisation,
- security & travel restrictions imposed on countries (e.g. entry & visa requirements),
- accessibility to airline travel from around the globe,
- biological & cultural diversity in the location,
- the position on the global rotation,
- minimized carbon footprint.

Bids must be submitted by the 31st March 2024, to the Secretary General Elect for the World Congress of Herpetology, Prof. Richard Griffiths, University of Kent.
Email: worldcongressofherpetology@gmail.com

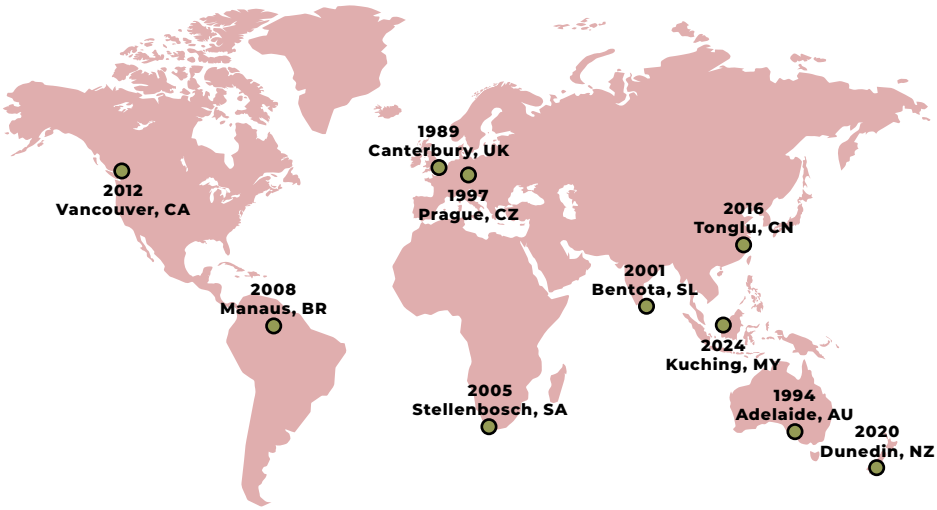
Short-listed bid contenders will be invited to present their bids at the WCH10 in Kuching in August 2024.

Flexible Global Rotation for hosting the WCH Congress in 2028

The WCH has now successfully run 9 world congresses in various locations around the world, including all biogeographic regions. The 10th WCH will be hosted in Kuching, Malaysia, 5-9 August 2024 and this will be the second time of these meetings in the Oriantal Region.

Considering the year and location of previous WCH meetings, the following list provides a basis for global rotation from 2028 onwards:

- Western Palearctic
- Afrotropical Region
- Neotropical Region
- Nearctic Region
- Eastern Palearctic
- Australasia & Oceania
- Oriental Region



A flexible rotation will allow WCH to ensure congresses are fairly and evenly rotated around the different biogeographic regions of the world. The rotation is flexible and acts as a guide only, and may not be strictly adhered to, however the position on the rotation list will be considered when assessing bids for future WCH congresses. Once a region successfully hosts a WCH congress its region will be placed at the bottom of the table, and will not be eligible to bid for the subsequent congress until it moves higher up the list.

Bids should include information on the proposed WCH including:

- the conference director
- the organising committee members
- technical organiser company
- the chair and members of the scientific program committee
- hosting institution(s)
- proposed dates
- detailed information on the location (transport & accommodation for a range of budgets available) & venue (conference facilities)
- proposed registration and accommodation fees
- proposed optional study/field tours and social programs
- an informative budget
- a letter from each hosting institution's leader to declare the willingness to participate in organising the congress

Bids will be distributed amongst the WCH Executive and International Herpetological Committees for feedback and consideration, and the venue and date of the Congress will be determined by the Executive Committee at the 10th Congress in Kuching in August 2024.

Call for nominations

for membership of the Executive and
International Herpetological Committees of WCH

The World Congress of Herpetology is governed by two committees, the Executive Committee (EC) and the International Herpetological Committee (IHC). The most important duties of these commitees are: determining the date and venue of each World Congress of Herpetology, appointing a Conference Director and Organizing Committee for each such Congress, and being responsible for the program for each World Congress (EC). The IHC is an advisory body to the EC and provides and disseminates information about the WCH to the regional herpetological societies. Those elected to both EC and IHC will be expected to play an active role in the duties of these committees, attend online committee meetings when necessary and respond promptly to requests for information or advice.

Nominations are now open for memberships for both committees. We seek enthusiastic colleagues representating all herpetological sub-disciplines and all regions of the world to be part of one of these two committees for the upcoming two inter-congress terms between 2024-2032. New members of both the EC and IHC will be elected by registered participants assembled at the general business meeting of 10th WCH in Kuching, Malaysia, between 4-8 August 2024. If the number of nominations exceeds the number of vacancies, then the election will be determined by the Executive Committee. A list of nominees along with their short biographies will be anounced in the WCH Newsletter (2024 June issue) published prior to the 10th WCH in Kuching, Malaysia.

Submission process:

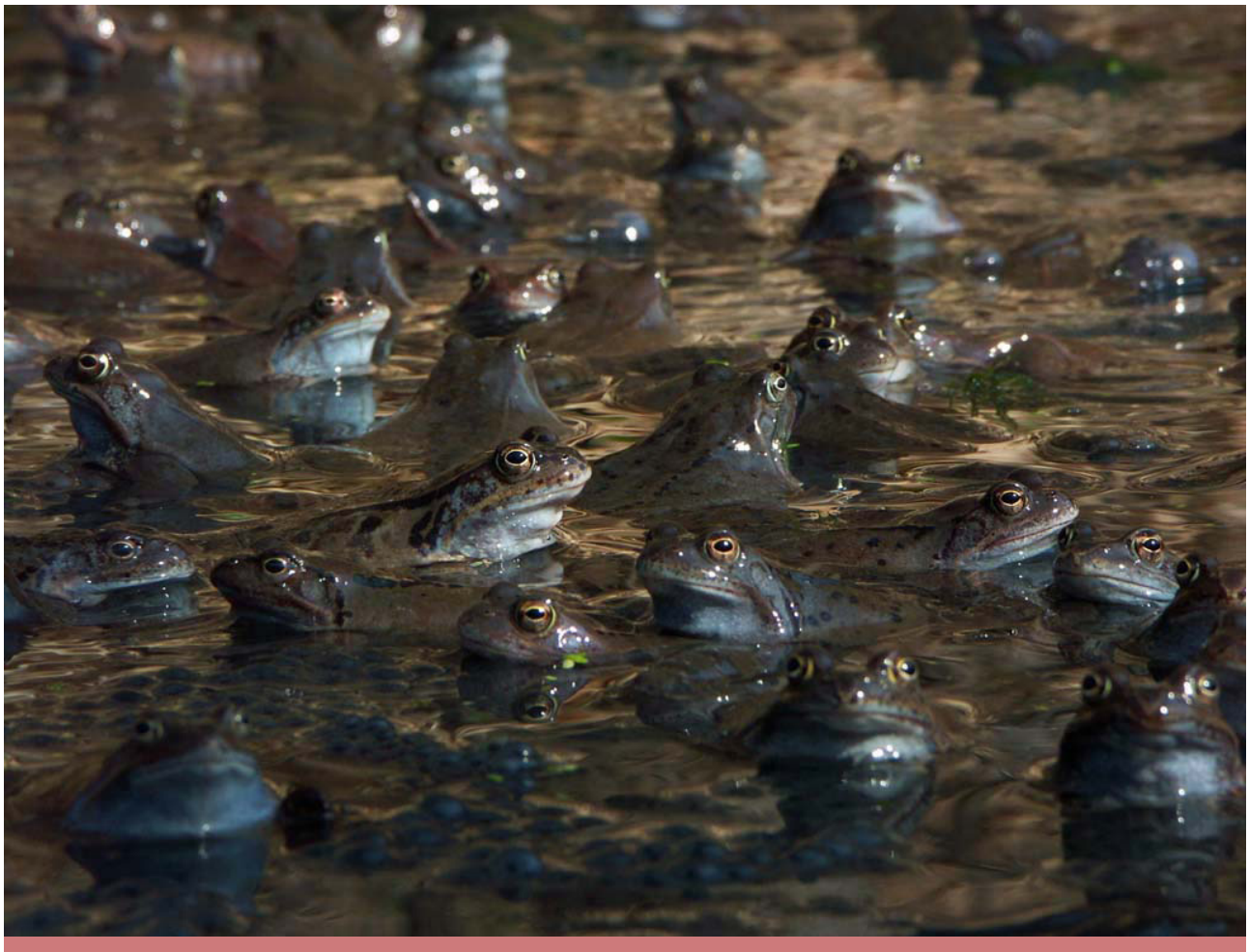
Nominations (and self-nominations) can be submitted via the following link until **31 March, 2024**

https://forms.office.com/r/DXhdd11hsg

As nominations can be submitted only with the written consent of the nominee, shall this be a self-nomination or a nomination of another person, the nominee must send an e-mail to **worldcongressofherpetology@gmail.com** and state the following:

I agree with the nomination, confirm I have read the WCH constitution, and accept and abide by the content of the WCH Code of Conduct. The e-mail should also include a short biography of the nominee, and preferably a portrait photo. The biographies and portraits (if submitted) will be published in un upcoming WCH Newsletter, to help members to vote during 10th WCH in Kuching, Malaysia in 2024.

With further questions about the call reach out to Judit Vörös, Secretary General of WCH at worldcongressofherpetology@gmail.com.



A meeting of *Rana temporaria* in North Hungary.
(Photo: Gábor Szelényi)

Introducing Place Borneo and an update on WCH10

Written by **Mona Abdul Manap**
CEO, Place Borneo
Kuching, Sarawak, Malaysia

E-mail: mona@placeborneo.com

Place Borneo Sdn Bhd is a Professional Conference Organiser incorporated in Kuching, Sarawak, in 2016, and now has an office in Kota Kinabalu, Sabah – both of which are Mala ysian states on the island of Borneo. Place Borneo actively bids for international conferences which fit the destination economically, socially and technologically.

A bit of background is necessary to explain how Place Borneo landed on the idea of bidding for the World Congress of Herpetology. Before starting Place Borneo, I was managing a tour agency in Sarawak and our specialty was adventure and niche products. One of these products was the Frog Photography Tour which I introduced, covering a few locations in Sarawak.

I am a birdwatcher and at that time, a budding frogging enthusiast. I wanted to seek out like-minded communities, so I joined several herpetology groups in Facebook and that's where I was eventually introduced to the World Congress of Herpetology. I contacted Business Events Sarawak who got me in touch with Professor Dr. Indraneil Das of UNIMAS, and the bid machinery was activated.

The rest, as they say, is history.

Place Borneo is run by 10 young energetic event professionals under the wise watchful eyes of our Principal Consultant and Director, Gracie Geikie. Gracie herself is somewhat of a living legend in the tourism and business events industry in Sarawak. She may not be able to tell the difference between a rock frog and a tree frog but she sure knows how to run amazing events! She was instrumental in the growth and popularity of the Rainforest World Music Festival – one of the top 25 music festivals in the world – held yearly in the Sarawak Cultural Village.

Music festivals are obviously different from conferences but that makes the Place Borneo team all the more versatile. They've got the discipline of running a tight academic conference but also the creativity and flair to add elements of entertainment into all their event production. An entertaining conference? Why not.

Miri Country Music Fest – an event organised by Place Borneo.

Post-event photo of past events done by the PB team.

Post-event photo of past events done by the PB team.

The team is understandably excited to be part of WCH; one, because it piques their interest about the cool hidden world of reptiles & amphibians, and two, because it makes them discover more about why Sarawak is such a valuable gem for its biodiversity not just for herps but for many other wildlife, and the need for conservation. For example, if it wasn't for WCH, they wouldn't have learned that Prof Neil re-discovered the once-thought-extinct rainbow frog, which even had a G-Shock (by Casio) special edition created after it.

However, the team is quite nervous (in a good butterflies-in-the-stomach kinda way) about how a bunch of herpetologists will be like when they're here. Will they be all crazy and wild like mad scientists? Or quiet and serious tough-nut types? How will they react to fun and games? Or would they prefer a straightforward run-of-the-mill congress? But judging from the closest living specimen here – Prof Neil – they could be the mild but secretly fun-loving kind after all.

The team at work.

In the course of creating a memorable congress, the team is working hard to make sure all the basics are covered; venue, hotel rooms, transportation, speakers, etc. But they're also trying to go a bit further; to secure special edition stamps just for WCH 2024, organising visits to a few important herpetological sites in Borneo and organising a daycare service to ensure all delegates are able to engage with full concentration.

An outdoor brainstorming session.

But, the above are fundamentals of conference planning which all PCOs will inadvertently have to plan for. What the Place Borneo team does – and this is new even in the business events industry – is designing the event. Event design takes into consideration all stakeholders, including the delegates, suppliers and organisers themselves, to make sure that the event achieves all its explicit and implicit objectives.

This data from the stakeholders are then consolidated into meaningful information that will be realised into a full blown event that's not just a collection of sessions, tea breaks and transfers. The event will be a designed flow of engaging educational experience, a conducive networking opportunity and a Sarawakian adventure like no other. These will all be intertwined into the lecture and workshop sessions, meals and tea breaks and of course in the pre or post tours.

Dark-eared Tree Frog by Mona during one of her previous frogging tours in Kubah National Park, Kuching Sarawak.

After the pandemic, face-to-face networking is appreciated even more and the thought of an online networking will be given the side eye. Networking is an organic activity which happens just about anywhere or any time. We may have provided you with the best networking lounge but your best encounter could be the potential research partner you met while lining up at the washroom. You will not be lining up at BCCK's washroom – in case you're wondering – but that was just an example. Of course, a curated networking space will ease the flow into impromptu meets and conversations, and that's what the team is trying to facilitate for this event.

Sustainability of the event is an important aspect which the team takes seriously. They work closely with the Borneo Convention Centre Kuching (BCCK) for this and ensure every possibility is considered for waste reduction, minimising carbon footprints, and sourcing local. Place Borneo is on an effort to develop its own Carbon Footprint Emission report but whether this will be in time for the congress next year, fingers crossed. As for the congress itself, a simplified calculation of its carbon footprint can be done online and this allows us to know the scale of our emissions and embark on an offsetting activity if required.

In this early stage of conference designing and planning, a lot of things can be done with the right input from delegates and stakeholders. Place Borneo invites all delegates to give their honest input and suggestions for the upcoming World Congress of Herpetology 2024. The team looks forward to welcoming all the delegates to our home, Sarawak, and share our culture, nature and exotic experiences.

Making small animals big – the Tadpoles of Borneo Project

Written by **Alexander Haas[1] & Indraneil Das[2]**

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[2] *Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. E-mail: idas@unimas.my*

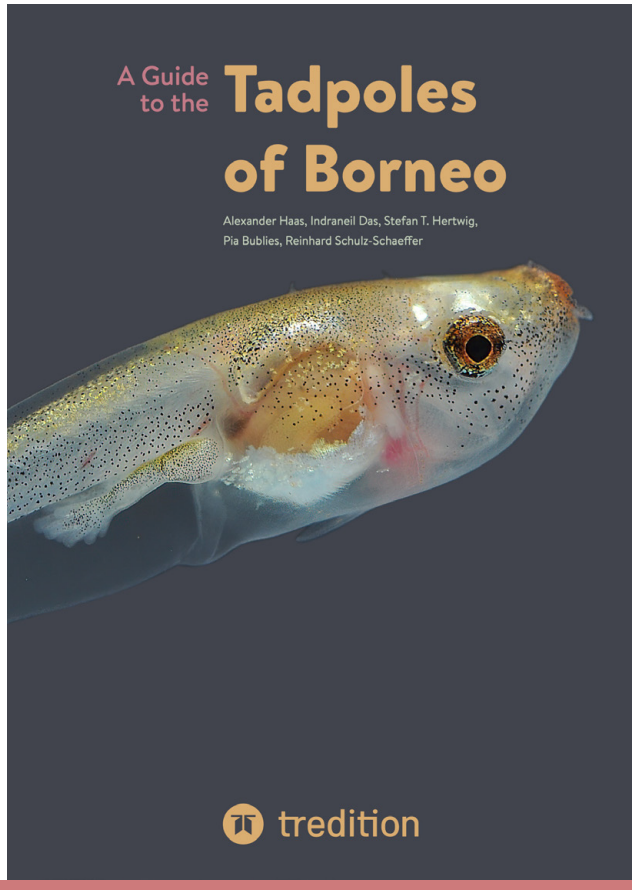
In the year 2004, two, then young, scientists with adventurous minds were anxiously sitting in a government office in Malaysia. They had submitted a research proposal to the authorities and were hoping to receive the pertinent permit papers. Whether a permit was about to be issued was unclear, as for some years before, the State had not been issuing research or export permits. They talked to the kind officer about the project and the officer clearly was struggling with the seemingly bizarre idea to study the tadpoles of Borneo. Why in the world would anyone make the effort to study such insignificant animals, he tried to reason. Of course, he was polite, and did not want to discourage, so he gave us this fatherly advice that it is a good thing to start with small animals and move to bigger ones. And how right he was! We left the office, grateful for the permit in hand, and started out on our big adventure- to catalogue the tadpoles of Borneo (and the frogs as well)!

Tadpoles are the larval life stages of most frog species. Tadpoles are part of a complex life-cycle that encompasses aquatic larvae, metamorphosis, and terrestrial adults. Larval stages play an important role in the biology of frogs and most other amphibians. In suitable water bodies, tadpoles can utilize several levels in the food pyramid, in extreme cases starting with bacteria and unicellular eucaryotes. Such food resources can be abundant and allow for quick increase in body mass of a tadpole. As many studies have shown, successful growth and development of the tadpoles have direct effects on performance and survival of the post-metamorphic frog. The fact that most frog species rely on this complex life-cycle only underlines its evolutionary success. It is a life-cycle that is not just a feature inherited from an distant ancestors but a state of being that is selected for because of survival benefits. All this, however, works to to the advantage of the species only if bodies of water with high primary food production are available. Some species have given up the free-swimming tadpole stage and bi-phasic life-cycle and undergo direct development in the egg. Such direct developers can be the predominant frog fauna in some areas where there are no oppor-

tunities for reproduction for bi-phasic species. On the island of Borneo, however, the vast majority of the currently recognized nearly 200 species follow the bi-phasic development and only a small fraction of species, namely some species in the genus *Philautus*, have been positively identified as direct developers (Hertwig *et al.* 2012).

We discussed the possibility of working on Bornean tadpoles as early as 2001, when Indraneil had invited Alexander to visit Borneo in order to do some first explorations of field sites. For Alexander it was the first trip to the region and Indraneil, who had been educated in India and Great Britain, had only arrived at his position at the Universiti of Malaysia Sarawak three years prior, with the establishment of the university's new Institute of Biodiversity and Environmental Conservation. Both of us were hyper-excited to explore the herpetofauna of Borneo. The first short reconnaissance trip together led us to the Kelabit Highlands and the Niah Caves. Soon the decision was made to combine our specific expertises and skills and submit a proposal to Volkswagen Foundation in 2003 with the objective to produce an inventory of the frogs and tadpoles of East Malaysia (Sarawak and Sabah).

The VW-Foundation grant application was successful the same year, and real work could begin after permits had been granted. The time for the start of the project was perfect for several reasons: For the inventory, we intended to document tadpoles in colour photographs. The previous work by Anstis (2002) and Chou & Lin (1997) had impressively shown that colour photo



Cover of the book *A Guide to the Tadpoles of Borneo*.

Fig. 1. The burrowing, eel-shaped tadpoles of *Leptobrachella mjobergi* live in the interstices of gravel beds of small to medium-sized streams. Their unusual lifestyle led to several interesting evolutionary changes in the musculo-skeletal anatomy of the spine and cranium (Haas *et al.* 2006).

documentation is so rich in information that we considered it mandatory in taxonomic descriptions of tadpoles. At the time, digital photography had just developed traction and the big camera manufacturers came out with first digital models that had sufficient resolution and image quality for serious applications in scientific research. Genetic barcoding is another essential tool in tadpole taxonomy, because assigning a tadpole to the correct species is not an easy task in a part of the world where new species had been discovered continuously and similar species may occur in the same area. At the time of the beginning of the project, genetic barcoding had been well-established and just become affordable enough even for larger numbers of samples on a routine basis. Genetic barcoding was and is the the ideal choice to establish reliability in tadpole identification; the wrongly assigned tadpoles published in the literature from the pre-genetic era attest to that. Last but not least, the excellent work of the past, particularly the valuable compilations in Inger (1985) set the foundation on which we could build on. His publications on the then known tadpoles of Borneo, although lacking photos of live tadpoles, helped tremendously to familiarize us with the larval diversity and their life habits. We consulted this work frequently in the beginning of our project because one question became imminently important early on:

Where to find the tadpoles?

This simple question turned out to be more difficult than expected, even with the ecological notes from Inger (1985). Bornean frog fauna is high in diversity but abundance is mostly quite low. The first two years of our project turned out to be frustrating and we started wondering if we would ever collect enough data to write a successful report to the sponsor at the end. Learning as we went along improved our skills and sharpened our perceptions. The more time we spent in the field, the more we were able to predict the microhabitats of species. We developed and built our own hand-net designs, photographic equipment arrays and capture techniques. We never used electro-fishing, although our predecessors had done so, because we wanted to reduce disturbance to the aquatic communities to a minimum and also wanted to learn, where in the aquatic

Fig. 2. *Polpedates macrotis* is a common frog in the forests of Borneo. It tolerates disturbed habitats and modified habitats to some extent. The larvae grow relatively large and possess an elaborate gill-filter. Typically these tadpoles are brown to olive but specimens of a population from the Matang range develop a colorful morph.

habitat the tadpoles were in concealment. Locating them under natural conditions seemed essential to us, and became a sort of hunting game at times. Soon, we realized that tadpole detection was far more successful at night. Experiences acquired in the field and constant improvements of the equipment and protocols soon paid. Spotting tadpoles in the field became routine, and a rich database, including thousands of images and a wealth of 16S DNA barcode sequences accumulated. From the early years, Stefan T. Hertwig (Natural History Museum Bern, Switzerland), then a student of Alexander, became our permanent collaborator who has since been contributing in all aspects of the project. We conducted field trips together and brought our research results to publication, often by giving specific projects to supervised students. Topics mostly centered around new species (such as, Hertwig *et al.* 2014, Das *et al*. 2014, Waser *et al.* 2016), phylogenetic relationships (for example, Hertwig *et al.* 2011, Hertwig *et al.* 2013, Flury *et al.* 2021, Etter *et al.* 2021), and tadpole taxonomy (for example, Haas *et al.* 2012, Oberhummer *et al*. 2014).

Fig. 3. Much of the ventral side of *gastromyzophorous* tadpoles is occupied by the oral disc and abdominal sucker. The photo shows *Meristogenys kinabaluensis*, a tadpole of up to 67 mm total lenth. The abdominal sucker attaches the body of the tadpole firmly to rock surfaces in fast, often turbulent water.

Fig. 4. Only one specimen of a larval *Philautus macroscelis* has been documented. The very short snout, lack of an oral disc and keratinized mouthparts, and presences of polygonal bluish-white iridocyte dots make it stand out from all other tadpoles on Borneo.

The application of barcoding allowed us to correct some misidentified tadpoles in the literature (Haas *et al*. 2009) and describe a number of tadpoles that had not been scientifically described before or needed an updated description (see citations above). Some cases were extraordinary indeed. On 19th September 2004, Indraneil had routinely swept a small stream on the upper reaches of Gunung Kinabalu with his net and was surprised to find a very strange-looking tadpole in his net. We stuck our heads together over the net and had a close look, but could not figure out the genus or even the family that this tadpole belonged to. Only later in the lab the case was solved by genetic barcoding. This discovery of a single specimen and highly unusual larval *Philautus macroscelis* resulted in taxonomic amendments and new hypotheses about the evolution of reproductive modes in Bornean *Philautus* (Hertwig *et al*. 2011). The modified *Philautus* larval morphology (short snout, reduced oral disk, reduced mouth opening) was later confirmed in the second, free-swimming larval form that we discovered and first described to science, *Philautus nepenthophilus* (Etter *et al.* 2021). Another memorable finding was the tadpole of *Leptobrachella baluensis*. On 13th August 2006, while down with fever, we encountered a small calling group of *L. baluensis* males along a forest path. The spot did not have water on the surface, however, water was running below the surface, along the gravel bed. Could there be tadpoles in the gravel? We figured that there was a possibility and began digging. And lo and behold, the hard work in this seemingly barren microhabitat finally surfaced a few of these remarkable fossorial tadpoles of that species. The burrowing tadpoles of *Leptobrachella* are undoubtedly a highlight in the tadpole fauna of Borneo, albeit difficult to find for the casual naturalist.

Fig. 5 *Microhyla nepenthicola* is one of the smallest frogs in the world. Males such as the one above typically measure 10.6-12.8 mm (females 17.9–18.8 mm). Eggs are deposited into ground-level pitchers of pitcher plants, particularly those of *Nepenthes ampullaria*. The tadpoles are very small, 9–11.3 mm in total length and do not feed (endotrophic).

The voucher specimens that we collected over the years gave us the opportunity to study the anatomy of *Leptobrachella mjobergi* in more detail (Haas *et al*. 2006). The species not only exhibits unusual arrangements of the cranial musculature, it also possesses a highly derived articulation of the first vertebra with the skull and larval vertebral column development that was later on shown to be found in other Megophryids as well (Handrigan *et al*. 2007). The highly derived head morphol-

ogy of gastromyzophorous tadpoles was highlighted in Gan *et al.* (2016) for *Huia cavitympanum* and *Meristogenys jerboa*, and that of the amazing carnivorous tadpole of *Occidozyga baluensis* in Haas *et al*. (2014).

In parallel to our team, other teams have contributed to the knowledge of anuran larvae on Borneo. First and foremost, Masafumi Matsui and, particularly his student Tomohiko Shimada published work together with multiple co-authors that included new and important tadpole data from Bornean species (among others, Shimada *et al.* 2015, Shimada & Matsui 2019). In sum, and building upon the excellent work by Inger (1985), knowledge on Bornean tadpoles grew substantially in the early 21st century. Yet, notable gaps in our knowledge remain. Surprisingly, for example, the tadpoles of some quite common species such as *Phrynoidis asper* and *Pulchrana baramica* have not been described scientifically and our team failed to discover tadpoles of these species in the field. Other groups defy the description of their larvae, because the taxonomy and phylogeny of the groups are unresolved (e.g., "kuhlii"-*Limnonectes*). Yet others reproduce secretively (*Kalophrynus*, *Pelophryne*, *Glyphoglossus*, *Gastrophrynoides*) or live as micro-endemics in remote localities (e.g., some *Ansonia* or *Pelophryne*). Locally performed breeding experiments could gather valuable information about the larval forms of such missing cases in the future.

We cannot help but mention a different topic that has lingered over biodiversity research for the past decades. We have been lucky enough to have the support of the Sarawakian and Sabahan authorities for almost 20 years. We would like to thank them for issuing permits and thus supporting our research. Field-collected voucher specimens are essential for our research and the field of taxonomy and systematics in general. Yet, in many tropical regions unauthorized activities by some individuals have negatively influenced the environment in which responsible biodiversity research can take place. The Malaysian territories on Borneo are no exception. Some scandals, cases of smuggling, and illegal fieldwork of various kinds (see the 2019 tarantula case, doi: 10.1126/science.aax1678) have increasingly sensitized State authorities and affected trust with those researchers who follow laws and regulations. Such negative effects by illegal activities are difficult to repair. Commonly, they

Fig. 6. Bornean *Philautus* have repeatedly been suspected to have direct development. Although this is true and has been confirmed for some species, others, such as *Philautus nepenthophilus* shown here, have free swimming larvae. *P. nepenthophilus* deposits eggs into pitchers several meters above the ground. The tadpoles have lost keratinized mouthparts and reduced the oral disc. They are endotrophic.

lead to more regulations and obstacles in connection with permitting processes. The Nagoya Protocol, originally designed, first, to standardize and facilitate procedures for non-commercial research and, second, to ensure shared benefits of the parties involved (Access and Benefit Sharing, ABS) has largely not yet brought the clarification and standardization of processes so many had expected (for example, Neumann *et al.* 2017). We hope that the implementation of the Nagoya Protocol mechanisms can be refined and adjusted further so that biodiversity research can continue to be performed under clear and transparent rules.

Public dissemination of research results is one of many ways of how to practice benefit sharing in the sense of ABS in bilateral collaborations. Early on in the project, we had the idea of publishing materials online in the form of a website, because we noticed the lack of an easily accessible resource on the Bornean frogs and their larvae, especially for southeast Asian students who might lack funds to buy the field guide available at that time (i.e., Inger & Stuebing 2005). We quickly created a small website. We wanted to keep it simple and present basic information and, most importantly, imagery of adults and larvae of as many of the recognized species as possible. At first, we started in a learning-by-doing phase with static pages, and after some years, we made the transition to a content management system driven website still operating today (Haas *et al.* 2022a). After going public, we were struck by the unexpected high number of clicks per day and soon realized that even with its rather basic and incomplete information the website was still welcomed by many users. We also learnt, however, that taxonomy and web technologies progress fast and that we underestimated the time needed for update and maintenance work for such a web resource, not to mention dealing with hacker attacks!

Finally in 2013, we decided to actually initiate the book project that we had already envisioned years before. We had not succeeded in collecting larval data for all Bornean species but we considered the data set solid enough for a book compilation. Another small grant from Volkswagen helped us to get started with the book. We were lucky to get additional collaborators and friends on board, Reinhard Schulz-Schaeffer, professor for scientific illustrations, and his former student, Pia Bublies, a freelance infographic professional. We opted for a print-on-demand publication model because we wanted to have complete freedom and control in realizing the project. We were ignorant, however, concerning the amount of work that such a self-publishing project would require. Composing the book in parallel with academic duties and demands proved to be challenging. In 2022, however, we were thrilled to present our book on Bornean tadpoles to the public (Haas *et al.* 2022b).

Working in the forest of Borneo has been an incredible experience and privilege for us. It seems that the scientific discoveries in Bornean forests will never end, and we sincerely hope that this unique place will be protected as a natural heritage for all mankind. We are grateful to all authorities, institutions, friends, field assistants, students, and many local helpers who have supported our work on Borneo for many years! For us, it was an exciting journey. And last but not least, we hope that the small tadpoles of Borneo will get the big stage they deserve!

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FrogID and the person behind it - interview with Jodi Rowley

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On December 16th last year, 'Songs of disappearance', an album featuring 58 threatened Australian frog calls recorded by citizen scientists and frog experts, hopped to the top of the ARIA charts (Australian Recording Industry Association), beating Taylor Swift and Michael Bublé. That week no herpetologist could avoid reading about the success of the album or watching interviews with the lead scientist of the FrogID project, Jodi Rowley. I have read many of Jodi's works before but I met her only in 2020 while participating the 9th WCH in Dunedin, New Zealand. She gave a plenary talk about the FrogID project and I was amazed by her professionalism and passion about amphibians. When editing this issue I decided to contact her and ask her to share her experiences about one of the most successful citizen science projects in history, FrogID.

Judit Vörös: Jodi, how did it start? Okay, probably you had this idea that you would like to launch a citizen science program to collect data on amphibian distribution, but what was the next step? Who did you approach with your idea? How much effort, how many meetings and how long did it take to finally being able to launch the project and the first recording was submitted for validation? Did you think it would be so successful?

Jodi Rowley: FrogID arose from a conversation I had with my boss, Kim Mackay AO (Director and CEO of the Australian Museum). I was chatting with her about frogs and the fact that every species had a different call and she commented "Well, we should make a citizen science app to record frog calls then". And with that, FrogID was born.

FrogID is based around a smart-phone app that you can use to record frog calls that are then identified to species by frog experts, building a database of frog occurrence records and associated audio recordings. The ultimate aim of FrogID are to help better understand and conserve Australia's

frogs, but also to assist land use planning, monitor environmental health and increase public awareness of frogs and how they are responding to a changing environment.

Now, if it had just been me that had to get the project up and running, I wouldn't have had the faintest idea how to go about it and if I did manage to somehow get the project started, it probably would have been only my friends and family that got involved! However, the whole Australian Museum got behind the project in a massive way, securing funds to and partnerships to make it happen. It was well over a year from the idea to the launch of FrogID- and it involved a huge amount of hard work from a cast of many- including app developers, digital and communications teams and frog biologists and photographers across Australia.

I remember on launch night I was at my computer, feverishly pressing refresh on the FrogID submission page, waiting to see if anyone at all would participate. Once I got dark and the frogs began to call, the submissions came rushing through. It was an absolutely amazing feeling!

Jodi Rowley using FrogID in the Northern Territory, Australia. (Photo: Stephen Mahony/Australian Museum)

The FrogID app. (Photo: Jodi Rowley/Australian Museum)

JV: More than 22.000 people have contributed to FrogID so far. Why does it work so well? Do people in Australia care about their environment more than in other parts of the world?

JR: It blows my mind thinking of how many people have contributed to the FrogID database. As I'm typing this, there are over 75,000 registered users (many more have downloaded the app) and over 40,000 users that have submitted audio recordings via the app!

I know I'm biased, but I think people everywhere care about frogs and the wildlife around them. It's just that people don't often know what to do to get involved. I think the FrogID project provides a really tangible and relatively easy way that everyone can contribute to informing conservation. A particularly important example of this was after the devastating "Black Summer" bushfires that occurred across eastern Australia in 2019/2020. Scientists were desperate to understand how these fires impacted wildlife, but they were followed by travel restrictions due to COVID, which meant that scientists couldn't get out there and conduct surveys. It was so frustrating! However, across the country, people that lived near the fire zone got out with the FrogID app and recorded

calling frogs- giving us data on how frogs were faring after the fires. This allowed us to publish the first data-based paper on the impact of the fires on biodiversity! Thankfully, there was some good news for many frog species (at least in the short-term)- with many frog species in mapped fire zones recorded with the first rains, some just days after the fires went through!

JV: This must be an enourmous work to run such a popular community program. Especially that all submissions are validated and species identifications are returned to the contributor. I myself help to run a similar project in Hungary where people submit findings without recordings and I can tell that validating the submissions is a really time-consuming and difficult task. How many people work for your team?

JR: It is! There is a core FrogID team, including a project coordinator and about a dozen frog call validators that pitch in as needed (the volume of frog call submissions is dependent on season and weather so are hard to predict). People across all corners of the Australian Museum are also involved in the project, as well as partner organisations across Australia. And, of course, there's all the people across Australia that are recording frogs – they're the heroes of the project!

JV: This is an amazing example how a well-built citizen science project can educate so many people. Can you share your favourite stories about how the project changed people's opinion about frogs?

As a scientist I was initially most passionate about the data helping inform frog conservation- but over time my perception

Amphibian Survey Team Vietnam. (Credit Jodi Rowley)

Amphibian Training Course Vietnam. (Credit Jodi Rowley)

Forest Camp Vietnam. (Credit Jodi Rowley)

has shifted and I actually think the greatest impact of FrogID may be the increased awareness about frogs that people across Australia have thanks to the project. We get a lot of amazing feedback, but some of my favourites are:

"3 months ago I knew nothing about frogs, and now it's all I see and hear."

"Within a very short space of time our frog knowledge and awareness has expanded. And recently, very late one evening after being on the road for eleven hours we passed through a shower of rain, we didn't think twice at pulling the car off the highway to listen to the frogs! Our life has become far richer."

JV: Already 204 species have been recorded using the app. What were the most surprising findings? Do you expect undescribed species to be found using FrogID?

JR: We're now at 218 frog species- which is 88% of Australia's known frog species! Unfortunately, getting recordings of all of Australia's frog species is likely impossible, with at least four species thought to be extinct. We do hold hopes that someone out there will record a call of a species thought to be extinct, though! Indeed, through FrogID we have had frog species rediscovered in places that they'd been thought to have disappeared from decades ago! We've also had people extend the known range of species by tens or even hundreds of kilometres, discover Critically Endangered frogs in streams they were previously not known from, and find out that several Australian frogs were being accidentally transported around the country and establishing new populations far outside their native range. Several publications describing Australian frog species new to science have also already used FrogID call recordings! Who knows what people will discover next?!

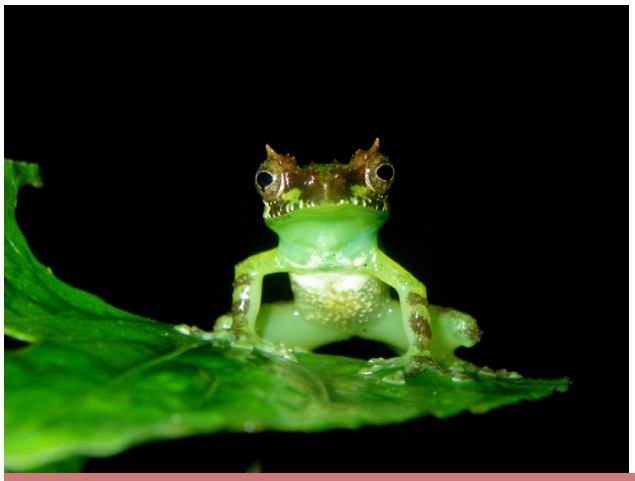
JV: Your team has already published 17 scientific papers and there are several on-going research projects that analyse the data from different angles. Do you receive requests often by scientists or conservation specialists that they would like to have access to FrogID data of certain species to help their projects or publications?

JR: Yes! A big part of my role as Lead Scientist for FrogID is to make sure that the hard work of all the FrogID users across Australia results in scientific and conservation outcomes for our frogs, and for biodiversity in general. Historically, there's been a fair bit of suspicion around how useful citizen science data can be, and by publishing scientific papers using the FrogID dataset, I think we've helped turn around that perception! Aside from annual provisions of FrogID occurrence data to government and public databases, we collaborate or provide data to scientists, land-owners and organisations across the country. We want FrogID data used, and thankfully it is!

Robust Bleating Tree Frog (*Litoria dentata*), New South Wales, Australia.

JV: You are the Curator of Amphibian & Reptile Conservation Biology, a joint appointment with the Australian Museum and University of New South Wales Sydney. You are editor of Zootaxa, supervisor of several students, author of many scientific publications describing new species from Australia and South East Asia. Besides all of these, you lead and represent FrogID, including dealing with media. How can you balance between so many jobs and tasks?

JR: I'm not going to pretend I do a great job of balancing everything, but I do try! There are two main things that help- first, almost everything I do is for a common goal, which is biodiversity conservation (with a focus on amphibians of course!). I'm incredibly lucky to work towards something I'm passionate about. Second, I work and collaborate with a team of people that share the same goal, and my institutions have been incredibly supportive. So, thankfully, I'm not alone in anything I do!

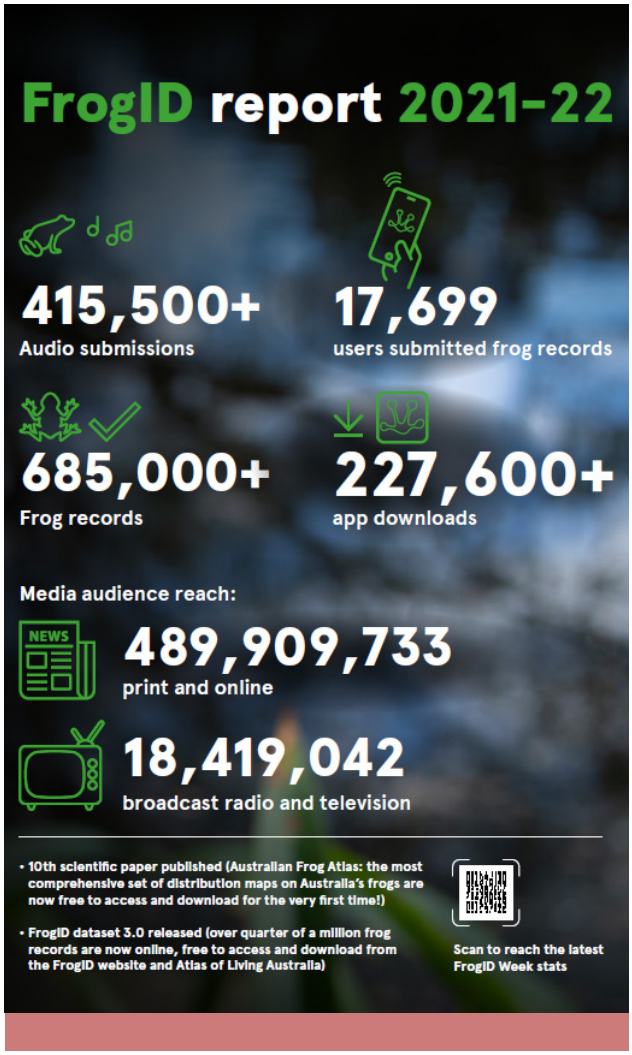


Gracixalus supercornutus, Vietnam. (Photo: Jodi Rowley)

Cape York Graceful Tree Frog (*Litoria bella*), Queensland, Australia. (Photo: Jodi Rowley)

JV: You lived and worked in Cambodia for several years as a wildlife biologist for Conservation International. You conducted more than 30 expeditions in South East Asia and contributed to the discovery of numerous amphibian species mostly from Vietnam. Are you still active in this area or are you more focused on Australian fauna since you are now based in Sydney?

JR: For the last five or so years, I've been devoting most of my time to FrogID and Australian frog research and conservation. However, I'm not giving up working on Southeast Asian Amphibians, and have continued collaborating with my colleagues on the amphibians of the region, particularly Vietnam. Fingers crossed I can return to Vietnam soon- it's been too long since I've spent time in the field in Vietnam with my friends and colleagues, seen a flying frog perched in the canopy, or heard the crazy call of a *Gracixalus*!



FrogID Report.

JV: Thank you Jodi for taking the time and sharing your inspiring story!

Jodi in Nui Ong Forest, Vietnam.

Cover image of the "Songs of Disappearance".

Interview with Professor Si-Min Lin

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When I first visited Taiwan back in 2008, I was introduced to professor Si-Min Lin of the National Taiwan Normal University (NTNU) in Taipei. At that time Si-Min has just established his lab called the "Grass-Fish Lab" with a motto "Nothing in biology makes sense except lizards" and in the subsequent years his research group published numerous studies on phylogeography and taxonomy of herpetofauna in Taiwan and other parts of East Asia, along with many papers on ecology, behavior, communication and signal transmission of amphibians and reptiles. Professor Lin is also actively participating in wildlife trade monitoring and is involved in numerous nature conservation activities in Taiwan. Thanks to our fruitful collaboration for many years I had a pleasure to visit the NTNU many times and I was always impressed by how Professor Lin manages organizing the work of dozens of students and creates a totally amazing atmosphere in his lab, which feels like one big family. To me Professor Lin was always an example of an ideal "laoshi" ("teacher" in Chinese), who knows how to very gently inspire people to work together and do science. In this interview we talk with Si-Min Lin about his way to do science and herpetology in particular, and also about his views on research, scientific inspiration, and student education.

Embarking on a snake research field trip as a young, first-year assistant professor. (June 24, 2005)

Nikolay A. Poyarkov: Professor Lin, I feel myself very privileged to interview you for the WCH newsletter. I have known you since 2008 and we have collaborated together for over 14 years now. I will never forget this crazy experience when I had no place to stay in Taiwan in 2009, and met you and your wonderful lab and was very much impressed by the work you and your students are doing and by the friendly atmosphere in your lab which felt like a one big family. Your lab is well-known both in Taiwan and outside of Taiwan, how would you describe your research interests right now?

Si-Min Lin: Originally, I was trained as an evolutionary biologist, so my group was mostly focused on molecular studies of phylogeny and phylogeography, finding cryptic species and genetic differentiations in Taiwanese amphibians and reptiles. And then we found that sometimes we don't have enough financial support every year to do costly projects. That was one of the reasons why we also became focused on behavior and long-term population survey. Then we found that here in Taiwan sometimes we have very closely distributed species with very narrow border ranges, and we started to think that maybe they have some signal differentiation, which causes their genetic differentiation. That was the reason why I turned my topic from pure molecular work to include morphology and signal transmission and behavior, and from this also to animal cognition – how they recognize the world and how they sense the world. If you want me to describe the major recent interest of our lab, I think it is signal transmission. And this topic is also relevant to some of my side projects on animal trade of reptiles because their welfare in the process is our concern. We try to connect these topics.

Conducting a field trip with students in the tropical regions of Taiwan. (September 8, 2021)

Our lab studies are also relevant to teaching, as I have taught evolutionary biology since I was a very young assistant professor, and that was very close to my first discovery of a radiation of grass lizards, genus *Takydromus*, including several new species in Taiwan. At that age, around 20 years ago, many people were following the biological species concept and many students and other colleagues asked me: "Do these lizards hybridize?" My first reaction back in that time "Oh, I don't care, I am just focused on the fact that these populations have distinct molecular signals." But a couple of years later I found that I was too proud to give this "simple" answer, because they actually do not hybridize and that's the reason why we see these different molecular lineages. I started to change my interests to "Why they don't hybridize?" Later it became evident to me that we should learn the underlying mechanism, so that we can figure out why these species don't or why they do hybridize or why they have partial hybridization. That's very interesting.

NAP: Sorry for the side question, but right now as a researcher and as a mentor of students, what species concept do you follow and do you think biological species really exist or not?

SML: If you want to describe a new species, the easiest way is to use the phylogenetic species concept. Recently, however, we find a lot of cases where the mitochondrial and nuclear genomes do not match giving often contradictory topologies and telling us very different stories. For a couple of years I was totally crazy about the phylogenetic species concept, I loved this concept so much as it could help me to solve taxonomic problems with no other considerations. But later we found that in fact there are cases when species is not monophyletic, but the behavioral traits make individuals from different lineages group together. As for the reality of species, yes, I think species are real, at least in ca. 98% cases. Evolutionary biologists want to resolve the remaining 2% of cases; they confuse us and make us interested in speciation.

Guiding a field trip with students in the mid-elevation mountains of Taiwan. (April 11, 2020)

NAP: I know that originally you graduated from a university course on physics, but then for some reasons you decided to change your topic and continued your education pursuing a career in herpetology and evolutionary biology. Can you tell us a bit about this choice, was it difficult, why you changed your mind and what influenced your choice?

SML: Actually I took my university course in the early 1990s, but to tell the truth I was already interested in biology since I was a little boy. But in Taiwan you need to pass six university admission exams if you want to study physics or chemistry, and seven if you want to become a biologist. When I was in high school, I did not have much confidence in myself passing the entrance exam to the biological faculty. Therefore I chose physics, as my physics knowledge was not bad. But when I was in the university, I established a student birdwatching and animal conservation group. That time, in early 1990s in Taiwan, field guides on amphibians and reptiles were not for sale for the public. Only field guides on birds and butterflies were available in bookstores. For those who wanted to become a naturalist, the only way to approach the wildlife was perhaps the birdwatching. I was interested in birds, fishes, turtles, different kinds of wildlife. However, actually I found that I can't specialize in birds, partially because I am color-blind and not being able to recognize colors is impossible for an ornithologist. Therefore, for my master degree I focused on studying fish, and did one of the first studies on using molecular markers to uncover genetic differentiation of freshwater fishes in the rivers of eastern and western Taiwan. That time we still did not have automatic sequencers; to sequence a fragment of mitochondrial DNA I had to run huge gels and use isotope markers. Around that time I met Professor Lue Kuang-Yang from National Taiwan Normal University who influenced me a lot. We invited him to the meetings of our student birdwatching group and he opened to me the world of amphibians and reptiles. I followed him and joined a PhD course under his supervision.

When I realized I wanted to study herpetology, I was actually in military service in southern Taiwan. I had only a very few chances to meet Prof. Lue when I had some days off, but I tried to meet him at least once per month. After I confessed to him that I wanted to become a herpetologist, he suggested to me two possible topics – *Hynobius* salamanders of Taiwan, or the grass lizards, *Takydromus* of Taiwan. I was considering what I should study and decided that I am more interested in studying salamanders. So, one month later when I came to see him again, I told him – I want to do the *Hynobius* salamanders. But, as Prof. Lue told me, another student of his – Lai June-Shiang, already took *Hynobius* as his major topic, so I had no choice but to study the grass lizards and started to catch *Takydromus*. That was in 1998 and I was around 27. And then I think I caught my first lizard around that time; I was quite old for a beginning herpetologist compared to many others. In 1999 I also joined my first herpetological meeting, which was the Asian conference on herpetology held in Chengdu, Sichuan. There I met many amazing herpetologists like Indraneil Das and Aaron Bauer, for example. I remember our flight from Chengdu to Hongkong was greatly delayed so we had to stay in the airport together for many hours and talked about everything.

That was the first time I realized I am actually a herpetologist. This herpetological meeting was quite important for me, when you meet not only famous professors, but also young guys like yourself, this makes you feel that you are not the only strange guy here – that there are many young people around the world who share your interests and motivation. This inspired me a lot.

NAP: Your lab is called "Grass-Fish Lab", and in addition to projects on various groups of amphibians and reptiles you and your students also work on other topics like raptor birds, civets, animal trade, and so on. However, is there something special in amphibians and reptiles for you as model subjects of your studies?

SML: Reptiles attracted me a lot when I was still an undergraduate student. When I was studying physics, I used to keep a lot of turtles in my dorm room. My classmates, now they are professors of physics and engineering, all remembered this story. When I studied to work on evolutionary biology, we found that the animals (especially amphibians and reptiles) living in the eastern part of Taiwan and in the western part of Taiwan are very different. This pattern perhaps was shown for the first time by my master's thesis supervisor Dr. Tseng, who studied freshwater fish. My study on *Takydromus* was the first case of this pattern to be documented for Taiwanese terrestrial animals. Today everyone is quite familiar with this situation, but back 20 years ago it was something completely new. I became very much interested in uncovering genetic and geographic differentiation in different groups of amphibians and reptiles in this island. That was the main motivation.

NAP: You mentioned Prof. Lue Kuang-Yang, the father of Taiwanese herpetology, who had a great influence on your scientific career. Who else motivated you the most to pursue your career when you were still a beginning researcher?

SML: I think it was Professor Hidetoshi Ota from Japan! That time when I just entered the field of herpetology, we – young students – heard a lot of stories about his studies and adventures in Taiwan. When I went to do my PhD program in 1998 it was already many years after he left Taiwan, but he really became a legend. Everyone was telling us what a great fieldworker he is, and how he collected specimens. They said when Prof. Ota was still a student, he did not have much money to stay in hotels so

Si-Min Lin, a dedicated reptile keeper, is deeply committed to conservation, wildlife trade policy, and animal welfare in captivity. (December 24, 2016)

he slept outdoors, went to remote and dangerous places, lived easy, drank easy, it was so cool! When I was a PhD student I also did not have much money, but I had a car and drove around the island to collect specimens along with some younger students. When we had limited funding and went somewhere without making hotel reservations or went to some wild places, we called it "Ota's trip". That means the fieldwork will be wild and hard, and maybe we will sleep somewhere in the street.

NAP: Talking about fieldwork, can you tell us about your most exciting adventure during your field trips?

SML: One time we almost drowned when we were camping on the bank of the river, and about midnight the water suddenly came up and in one minute destroyed everything. It was a pretty dangerous situation. We grabbed our cameras, our specimens, and quickly climbed a cliff on a bank of the river, where we had to stay for the whole night under our umbrellas. But we were safe. I just lost my watch.

NAP: My dream is to establish a lab of herpetology in my university and for me you actually are a kind of a role-model for an ideal teacher, an ideal laoshi. I mean the way you build the relationships with your students and how you make them all work as one team. Are there any secrets in how you run your lab?

SML: I think I just want to know what the needs of the student are, because not everyone wants and needs to become a scientist. I think it's perhaps Asian culture because many students are forced to study in university or study for a graduate degree. At first they don't know what they want but gradually they realize that some of them want to become a scientist, and some others want to become a teacher, and others a journalist, or a painter, or want to work for the government. For the teacher the most important thing is to realize what they want to do, and then you help each other. I really want to help my students if they want to achieve something, and I will respect their decision.

Si-Min Lin alongside Indonesian collaborator, Fitra Arya Dwi Nugraha in a sea turtle conservation camp. (October 19, 2019)

All my students in the lab are working on topics which they enjoy to work on. That is the reason why they could always do excellent jobs.

However, it is not easy for most students in Taiwan to finish the English writing of scientific papers, at least at the beginning of their career. Therefore for those students who don't want to be a scientist, as long as the quality of the data is not a problem and students are hard-working, I am always happy to help with the analyses of the data and writing. This is my job as a laoshi. I will try to publish the data they get, and knowing this the students would feel safe because they trust in me.

For those students who want to be a scientist in the future, I would give them more tasks, step by step, asking them to organize this section, or analyze this set of data, slowly but steadily teaching them how to submit their own paper, because I think it is important for a PhD student to train, for example, how to write a cover letter, how to present your data and so on. During my student days in Taiwan all PhD students had to study this by themselves – just going to the journal's website and studying the whole process from zero. This is not very good for a PhD student, so I will show my students how to pass all of these stages of scientific work up to paper submission.

NAP: Indeed, it's very hard for a student to write his or her very first scientific paper. Do you have any hints how to break the writers' block and start publishing your research?

SML: I think especially in Asian countries most students have no confidence in writing in English. However, I think if they can write something, this is a benefit for me because I just tell them that in most cases I will be the one who organizes the paper before its submission to the journal, but I don't have enough time to handle everything. I always tell my students that every sentence you write is informative for me. It doesn't matter if at the submission every sentence is different from the original version prepared by the student. But the original ideas which students try to reflect in the draft they prepare are very important for me; I encourage my students to write anything they want. I try to make my students feel confident about that their work will be published when we work together, so they could learn scientific writing step by step.

The first scientific paper in English in my life I submitted to the journal Molecular Phylogenetics and Evolution. When I finished writing it, I thought "Oh, that should be my best and my last paper, I will never be able to write anything better than that!" But surely it's not true, the more you publish the more progress you make and your papers should get better and better.

NAP: To me your lab is very international, with many students not only from China, but also from Japan, Vietnam, Philippines, USA, Russia, and other countries come to work with you. What do you think about international collaboration, how it impacts your work and the studies of your students?

SML: I think the problem of most Asian students is that they are too shy to speak English. When we have a foreign student or colleague in our lab, they must practice English because they have to communicate. That's a good chance for everyone in my lab to start speaking English and communicate with someone from a different culture. Usually you have to go with foreign students into the field, so I think this is a great opportunity especially for my young students to explore their vision and get confidence in themselves.

NAP: The original motto of your lab really impressed me when I first saw it in 2009. It says "Nothing in biology makes sense except lizards". Could you please comment on this? How you came up with the idea of this slogan?

SML: Oh, that's a funny story. Around that time, we wanted to make a lab logo, and one of my most senior students designed a cute chameleon. Then we needed some phrase which could make a circle around the logo to make it looks complete. As I told you, when I was young, I did not really think of myself as a herpetologist, but rather as an evolutionary biologist. So we took this famous phrase from Theodosius Dobzhansky: "Nothing in biology makes sense except in the light of evolution" and changed that to lizards.

Members of Si-Min Lin's lab along with Russian and Vietnamese collaborators at WCH8 in Hangzhou, China. (August 18, 2016)

NAP: Great story! But do you indeed think that lizards as a model object are something unique for evolutionary studies?

SML: I would not say the lizards are 'unique', but there are many benefits when working with them. Lizards are easy to handle compared to birds or mammals, this helps a lot for research on their ecology or behavior.

NAP: What advice would you give to the younger yourself, in terms of how to be successful and pursue your career in herpetology and evolutionary biology?

SML: I think this kind of question assumes you regret the choices they made in the past. But I never regret my choices. Every year in my lab I just explore myself to new knowledge and new research field. If I would restart my career, I would study biology since I was an undergraduate student and would not study physics. But this would just make me start biology four years earlier. I don't think this would change much. Actually, I don't regret studying physics at the beginning. The point is that the requirements of the course in our university were quite low (at least for me), so I had plenty of free time which I spent mostly on going into nature and birdwatching, and for few years I was quite interested in plant identification. I collected many plants and tried to identify them by myself, but I had no teacher in botany and had some limitations. Perhaps I would not be able to do that if I start studying biology in the university from the beginning.

NAP: Among the many projects you and your students and colleagues completed, which one you like the most? What is the most exiting discovery you made?

SML: Actually it is that we managed to teach turtles to recognize numbers! We have studied cognition of turtles, and we were teaching them to recognize between high numerosity and low numerosity. We worked with *Mauremys sinensis* and they can easily recognize between nine and ten. We used red cubes which were placed on a white board and they had to recognize the higher number side, they had to choose the higher number, swim there and then they got a food pellet as a reward. And turtles can do remarkably well!

NAP: I would like to ask you about herpetology in Taiwan. I have been to your island around ten times and though it is small, it has a unique and very interesting herpetofauna. For you, what does it mean to study herpetology in Taiwan? What are the main advantages and disadvantages?

SML: First, I would like to talk about the disadvantages of working in Taiwan. In fact the species diversity in this small island is quite low. We don't have many species and lack several families and genera which are common on the Chinese mainland. Some people say that the level of endemism in the Taiwanese herpetofauna is high, but I cannot fully agree with this. Compared to some other unique islands like the Philippines or New Caledonia, for example, both species diversity and the level of uniqueness of the Taiwanese herpetofauna is actually quite low.

Also we are not able to do higher-level taxonomy or phylogenetics in recent years because of the Nagoya protocol. It is quite difficult for us to get specimens or tissues from other countries.

As for the advantages of doing herpetological studies in Taiwan, I would like to stress the following. Since I was a PhD student, I have noticed that sometimes we have high-divergence lineages with very narrow ranges and close distributions. Now this pattern is reported in many groups of reptiles and amphibians in many places around the world, but I think the Taiwan was the one of the places where such interesting cases were documented for the first time or at least very early. The eastern part of Taiwan is especially interesting – here it may take just few kilometers to get from the range of one species to the range of its sister species. Therefore, it would be very easy for you to study the evolutionary situation across the contact zone between the two species. That is one of advantages.

Another advantage is that it is very easy for young students to get into the wild just within 30 minutes or one hour drive. They can easily get out of the city and find their first frog, or their first snake. I know that in some other countries sometimes you need to drive quite a few hours to several days to escape from the city or agricultural habitats and get to your sampling site. In Taiwan you can reach almost everywhere within an hour or so. This greatly benefits the students to get closer to the nature they study.

NAP: I would like to come back to your studies on Takydromus lizards. But after your first studies on this genus, you and your students published a series of very interesting papers covering almost all aspects of biology of these lizards. What is the most specific and amazing about the Takydromus grass lizards?

SML: I think it's a great subject in many aspects. Most *Takydromus* lizards are quite short-lived and in some habitats they reach huge population sizes. One of amazing stories is when during a sampling trip my students and I, a total of about 10 of us, collected 596 individuals of these lizards just in two hours at night. During the eight years of collection efforts, we on average collected around 280 individuals every month, but we spent just two hours for specimen collection every month. It is relatively easy to get a lot of samples in a short time. Another interesting feature we found is that the species we work on are sexually dichromatic. This means that males have courtship coloration during the breeding season. Therefore, we started to study visual signals from the viewpoint of the opposite sex or a predator and did various analyses on color vision and its evolution in these lizards. All these aspects make *Takydromus* a perfect model subject for various researches on different aspects of evolutionary biology, speciation, behavior, and signal transmission.

NAP: Can you tell us, what do you think about the WCH meetings? Is it important for the beginning students to attend the WCH meetings, or is it more for the grown-ups? What do you enjoy the most about the WCH?

With Dr. Jing Che and Dr. Mi-Sook Min at WCH9 in New Zealand. (January 10, 2020)

SML: I think the most important aspect of WCH meetings for me is to let myself recognize that I am a herpetologist. When I join the international meetings on herpetology, I realize that there are so many friends who will echo your findings, many experts who are familiar with what you are studying, and this is very important. For example, here in Taiwan when you talk to your colleagues, including biologists and zoologists, and tell them about Takydromus grass lizards; many would say "What? I am not familiar with these lizards!" But in the WCH meetings you can talk about any kind of animal and you will always feel some response, some echo, like "Oh, I know this species, they are so interesting and cool!" I think this is very helpful for the young students to recognize that they are not the only crazy guys here. A lot of young students in the beginning told me that they are a bit stressed because sometimes they don't know why they are studying this or that animal, how their studies would help the science or humanity and so on. After they join a WCH meeting they never have such fears anymore, because they feel that their research is required and important, and they get a lot of encouragement from seeing many friends doing similar research.

Members of Si-Min Lin's lab at WCH9 in New Zealand. (January 7, 2020)

At the same time, for students I think it's better to join the WCH for those who have already their own data, I think it's better when you are well-prepared for the WCH meetings.

NAP: What was the most rewarding moment in your career?

SML: You won't believe it but actually the proudest moment in my career was when I successfully bred monitor lizards! I was keeping several pairs of the sulphur morph of water monitors (*Varanus salvator*). They are very big. And I was the first one in Taiwan who managed to breed them! I was so happy! In fact I also consider our studies on pet trade quite important. The reason is that I love to keep animals and to breed them. And it is somehow important for my research as well, because I am involved in developing some wildlife-related policies in Taiwan and we have to communicate with the herp community as well as with keepers, breeders, and sellers. I have to communicate with these guys, and if I can breed a challenging species, they would respect me more, trust me more, and regard me as one of their members. This is quite important for better handling of the wildlife trade issues.

NAP: So my last question is if you have a favorite species of amphibian or reptile?

SML: Monitor lizards! Just like a lot of other people, I love giant lizards, giant snakes, and crocodiles!

NAP: Thank you very much for the interview. Hopefully I will see you at the upcoming WCH in Kuching!

Annual lab gathering during the New Year vacation, which consistently attracts numerous past lab members to reunite. (January 22, 2019)

Chronology of events in Bhutan Herpetology

Written by **Jigme Tshelthrim Wangyal**
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I am a Forester by trade, but my passion lies in herpetology. When I started my career in managing forests and wildlife, I noticed that the conservation plans often overlooked amphibians and reptiles. This motivated me to delve into the subject. Nowadays, I love discussing Bhutan's herpetology whenever the opportunity arises, regardless of whether my audience shares the same interest. This small nation is nestled within the mighty misty eastern Himalayan Mountain ranges and has a lot to offer in terms of its unique flora and fauna.

To provide context for discussing amphibians and reptiles in Bhutan, it is necessary to first introduce the country itself, which may be unfamiliar to many herpetologists. Bhutan is a small nation located between China and India (Figure 1), covering an area of approximately 38,394 km^2 and home to a population of just under 800,000 people. Despite its size, Bhutan is unique in mandating a perpetual forest cover of 60%, which contributes to its rare carbon negative status, one of only two such countries in the world. The country's diverse topography, which includes high mountains, dense forests, and expansive river valleys, provides a range of habitats for a wide variety of species, thanks in part to the Kingdom's protected area strategy, which has designated more than 50% of the total area as national parks, wildlife sanctuaries, a strict nature reserve, and a botanical garden (Figure 2). Additionally, the Kingdom's state religion, Buddhism, supports conservation efforts for all sentient beings, and conservation policies and laws are easily endorsed, further highlighting Bhutan's dedication to nature conservation. Notably, Bhutan is often regarded as a unique country for prioritizing gross national happiness as a measure of development, rather than relying solely on gross domestic product.

Bhutan's forest cover, which makes up 70% of the country's land area, is managed by almost 2,000 trained officials who are dispersed throughout the nation. These officials are responsible for overseeing all of the country's natural resources, including its herpetofauna (reptiles and amphibians), although these species do not receive as much attention as other taxa, such as mammals, birds, fishes, and plants.

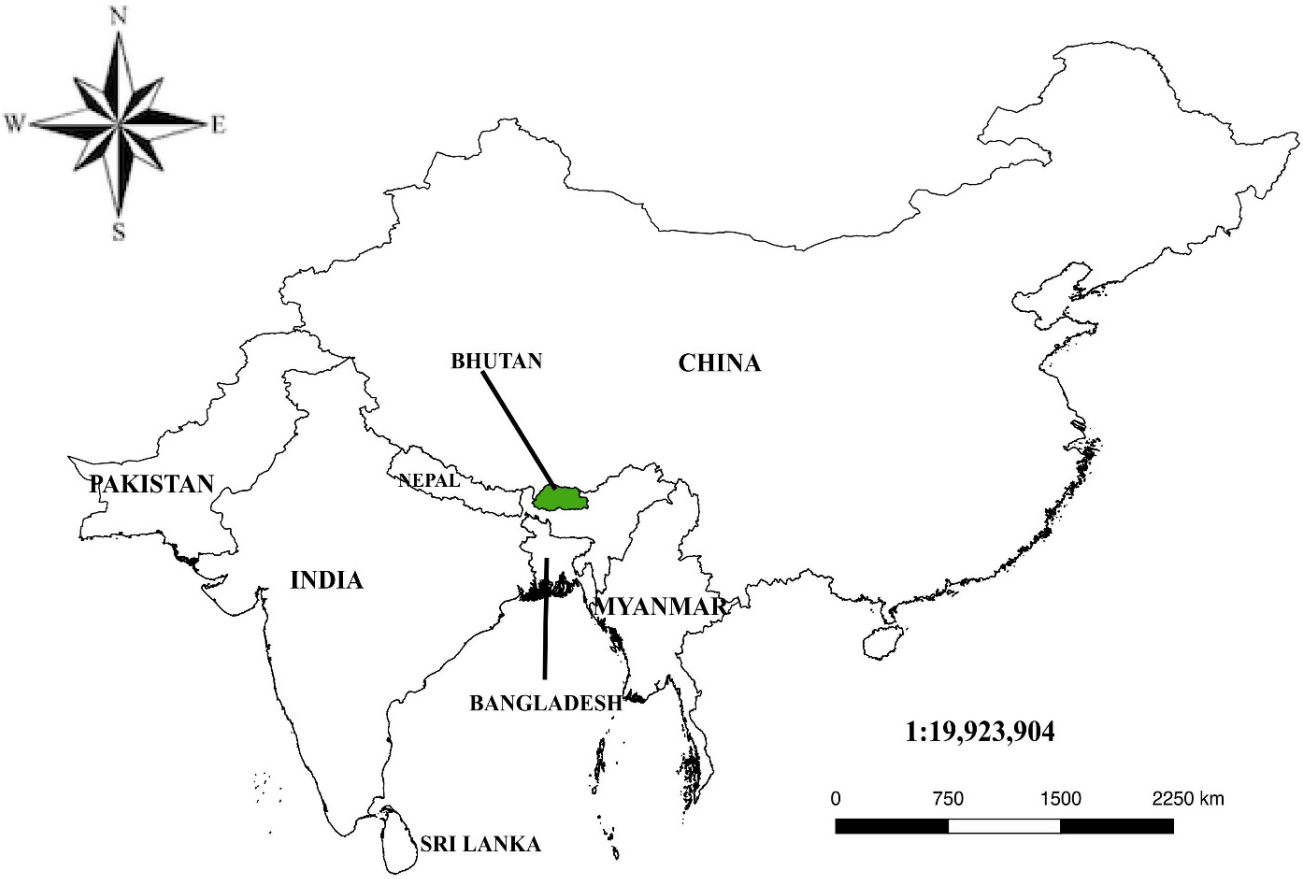


Figure 1. Location of Bhutan.

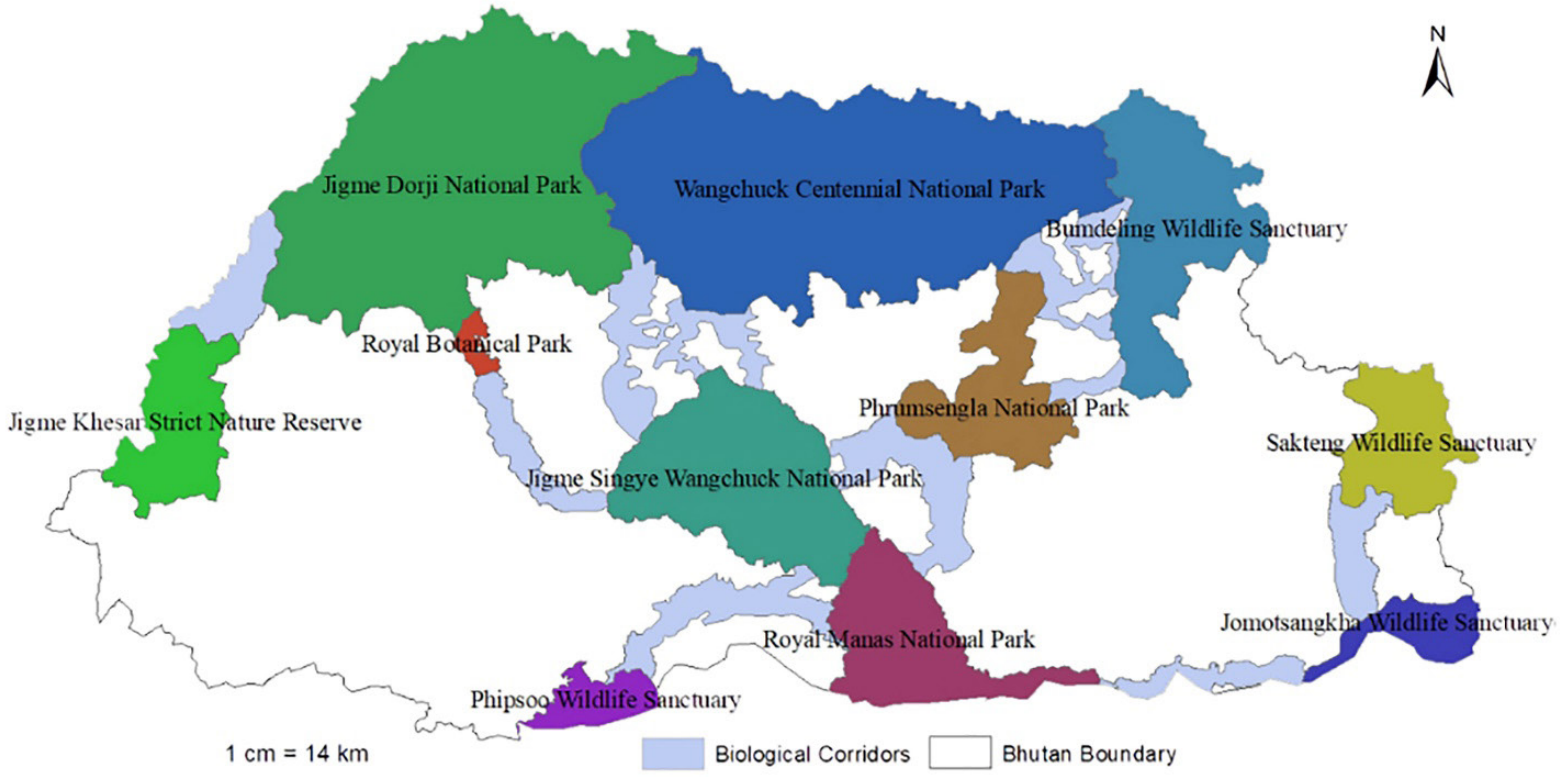


Figure 2. Protected area network of the Kingdom of Bhutan.

As a result, the conservation efforts for any plant or animal species in Bhutan often begin with the foresters who manage the forested areas.

The origins of animal collection for conservation in Bhutan can be traced back to the Kolkata-based Zoological Survey of India, which was granted permission by the Royal Government of Bhutan in 1966, 1967, and 1969 to collect various species of mammals, birds, and other animals. During these trips, which occurred in March-May 1966, November-December 1967, and January-March 1969, the team, led by B. Biswas, managed to collect five specimens of reptiles. One of these specimens, *Calotes bhutanensis* Biswas, 1975 (depicted in Figure 3), turned out to be a previously unknown species. Additionally, in April-May 1972, Drs. O. Stemmler and M. Wurmli from the Naturhistorischen Museums Basel (NMBA) were permitted to explore the jungles of southwestern Bhutan and collect specimens, which were transported all the way back to the Basel Museum, Switzerland.

In the face of the declining population of Gharial (*Gavialis gangeticus*) in their natural habitat in the Royal Manas National Park (as seen in Figure 4), four Gharial individuals and five Mugger Crocodiles (*Crocodylus palustris*) were relocated to the Phuntsholing suburb in 1976. The crocodiles were housed in a small pond area, which was later expanded, and the enclosure was given the name Norgay Crocodile Breeding Farm (as seen in Figure 5). The farm was open to visitors until recently.

Figure 3. *Calotes bhutanensis*, described by S. Biswas in 1975 from Pangzurmani between Trongsa and Zhemgang. (Photo: Kado Rinchen)

Figure 4. The Royal Manas National Park landscape, the original habitat of *Gavialis gangeticus*. (Photo: Karma Wangdi)

Figure 5. Crocodile Breeding Farm, Phuntsholing, also attraction for visitors. (Photo: Unknown sources)

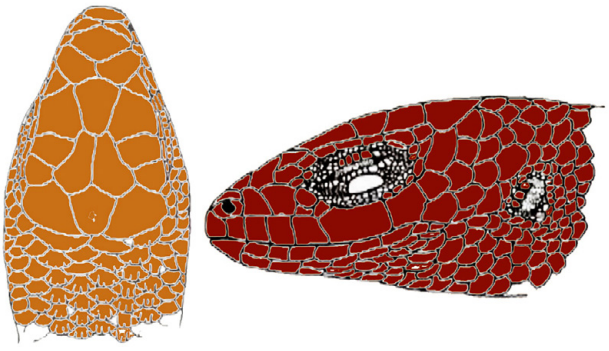


Figure 6. *Eutropis quadratilobus*, recreated from Bauer and Gunther's work by Jigme Tshelthrim Wangyal. The species is yet to be recorded after its first collection in 1972.

In 1979, HR Bustard, a British official working for the Food and Agriculture Organization, reported on the state of commercial crocodile farming in Phuntsholing. The next year, in 1980, he reported on the status of Gharial and the sad news of its extinction in the Royal Manas National Park in Bhutan.

In the western part of the world, the Museum für Naturkunde in Berlin borrowed the collection from NMBA and examined the specimens. As a result, Bauer and Günther described another species new to science, *Eutropis quadratilobus* (Figure 6) in 1992. They also prepared a list of 18 species of reptiles found in Bhutan, including the species reported by Biswas in 1975. However, Bhutan has not yet located *Eutropis quadratilobus* in the wild, and a thorough search is needed before we confirm its presence in the field.

In 1985, the presence of *Tylototriton verrucosus* (Figure 7) in Bhutan was reported in the book "Amphibian Species of the World: A Taxonomic and Geographic Reference" by Frost. This report was later confirmed by Jigme Palden, a college lecturer who was living in the habitat of *T. verrucosus* at that time (Figure 8).

In 1999, Dr. Indraneil Das was invited by Jigme Palden, the then Park Manager of Royal Manas National Park, Gelephu, Bhutan, to train selected staff of the country's protected area network in herpetological field techniques. During the training, seven species of amphibians and twelve species of reptiles were collected by the trainers and trainees, and the commonest species, *Duttaphrynus melanostictus* (Figure 9), was reported as a new country record. This report highlights the poor record-keeping of Bhutan's herpetofauna and was also the first formal report on any amphibian species in the country.

In 2001, a new species of Bhutan Cat-eyed Toad, *Scutiger bhutanensis* (Figure 10), was described by Delorme and Dubois, but with no information about its specific location. It is believed that the specimens were found around mount Jowodurshing, also known as the Black Mountains (Figure 11), as similar specimens were later collected and reported by foresters in the country.

Following a hiatus of almost a decade, Bumdeling Wildlife Sanctuary began to take inventory of its reptile fauna and published a field report (Figure 12) documenting all the species found in the country in 2009. The report revealed a remarkable 32 new species records for the country. Since then, several other reports have been published on topics such as new species records, distribution, and natural history. Among these reports is the description of a new species, *Amolops wangyali*, by a team of herpetologists from the Natural History Museum, London and Sherubtse College, Bhutan.

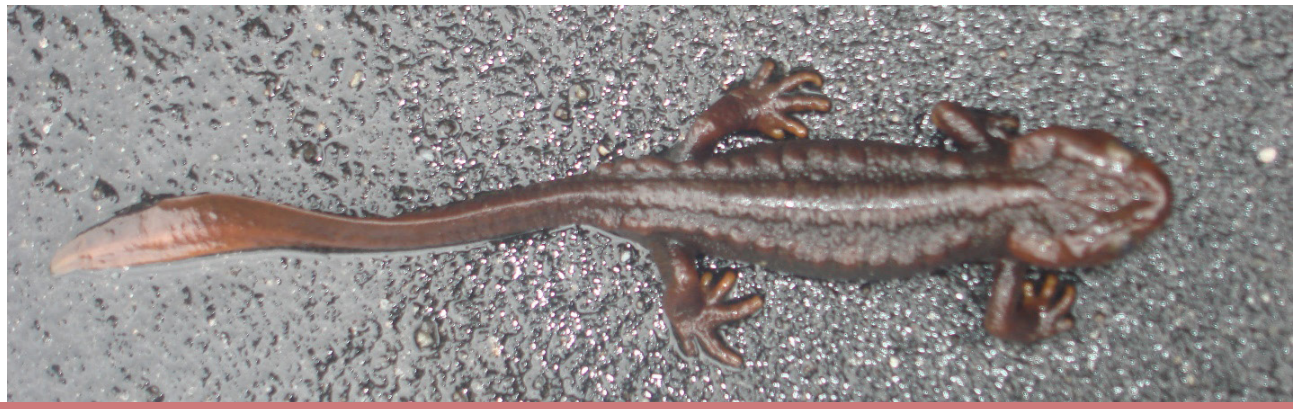


Figure 7. *Tylototriton cf. verrucosus* from Thinleygang, the only salamander species of the Kingdom of Bhutan. (Photo: Jigme Tshelthrim Wangyal)

Figure 8. A valley in Punakha, the habitat of *Tylototriton verrucosus*. (Photo: Archives of Bhutan Ecological Society, Thimphu)

Apart from the small crocodile conservation center, which has been relocated from Phuntsholing (Figure 5) to Gelephu (Figure 13), and is managed by the personnel of the Forest and Parks Department, Bhutan currently lacks a specific policy to address the conservation of amphibian and reptile species, whether in the wild or in captivity. Nonetheless, the country's forestry officials consider all plant and animal species important and take prompt and appropriate action when necessary.

Figure 9. Common Asiatic Toad, *Duttaphrynus melanostictus* which was reported as a new record for Bhutan in 2000. (Photo: DB Gurung)

Herpetofauna enthusiasts (mostly foresters) in Bhutan rely on citizen science to collect information on amphibians and reptiles, as there are no NGOs or civil societies dedicated to conserving these species. Despite the lack of external funding or training support, enthusiasts have made significant progress, thanks to the dedication of the country's foresters (Figure 14) who prioritize herpetology as they do other taxa.

Figure 10. *Scutiger bhutanensis*, an endemic alpine toad, described from Bhutan in 2001 by Delorme and Dubois. (Photo: Phuentsho)

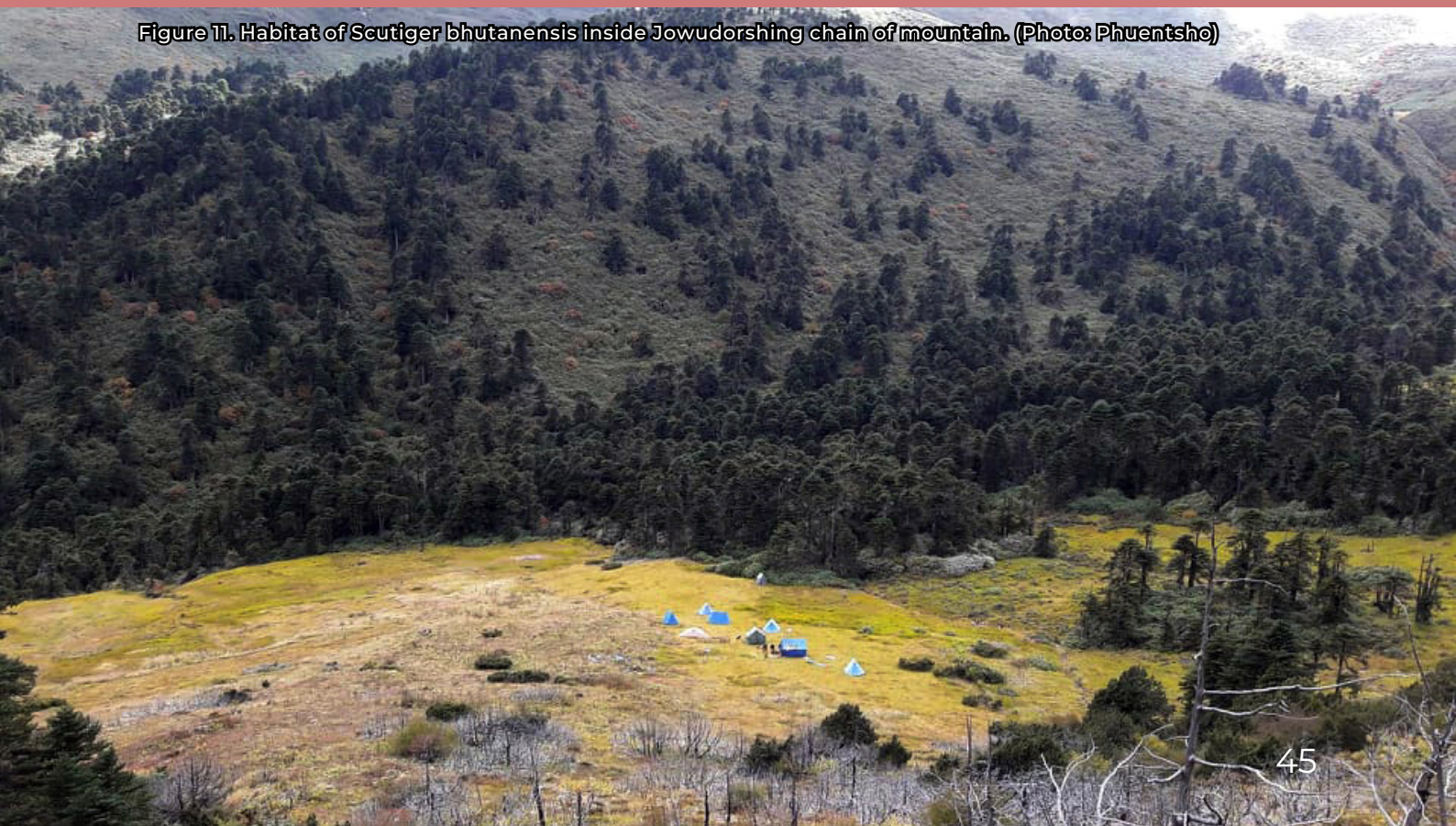


Figure 11. Habitat of Scutiger bhutanensis inside Jowudorshing chain of mountain. (Photo: Phuentsho)

This has led to the production of two guidebooks: one for reptiles, authored by Jigme Wangyal and Indraneil Das in 2021, and another for amphibians, authored by Jigme Wangyal in 2022. By way of reptiles, Bhutan is home to 102 species of snakes, 39 lizards, six turtles, one tortoise, and a small population of captive Gharial and marsh crocodiles while there are only 83 species of amphibians (mostly anurans) including one salamander species and two undescribed caecilians.

Figure 12. Cover page of Bhutan's first colour reptile diversity report after which a number of papers were written on the herpetofauna of Bhutan.

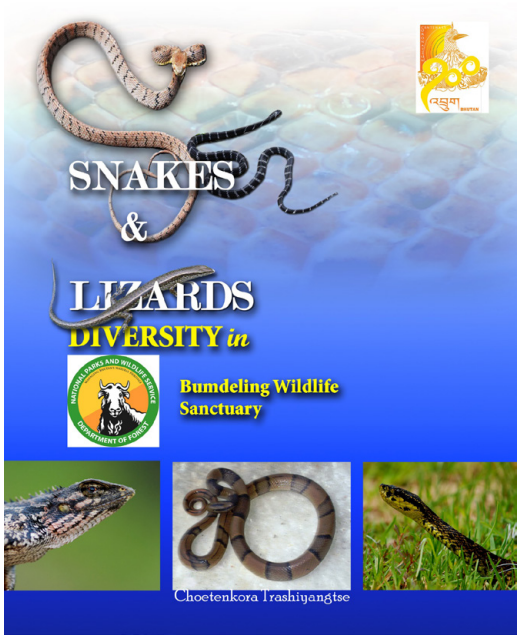


Figure 13. The recently established Crocodile Conservation Centre, Gelephu (Photo: Sangay Dorji). The crocodiles have since been moved to this centre from Phuntsholing.

Figure 14. A set of field foresters who have taken Bhutan herpetology by storm.

Request for advice

The first versions of the WCH Newsletter (no. 1–5. published by Kraig Adler between 1983–1986), focused mainly on the organization of the first WCH congress in Canterbury. A section within these newsletters was called 'Request for Advice', and in this section Kraig Adler solicited advice from the global herpetological community on how to structure the congress. Specifically he said, "Since we are not bound by tradition we should try new approaches wherever they seem worth attempting." There were some 'radical' decisions made for the first congress as an outcome of this – for example, no oral contributed papers, instead attendees presented their contributed research in a series of poster sessions!

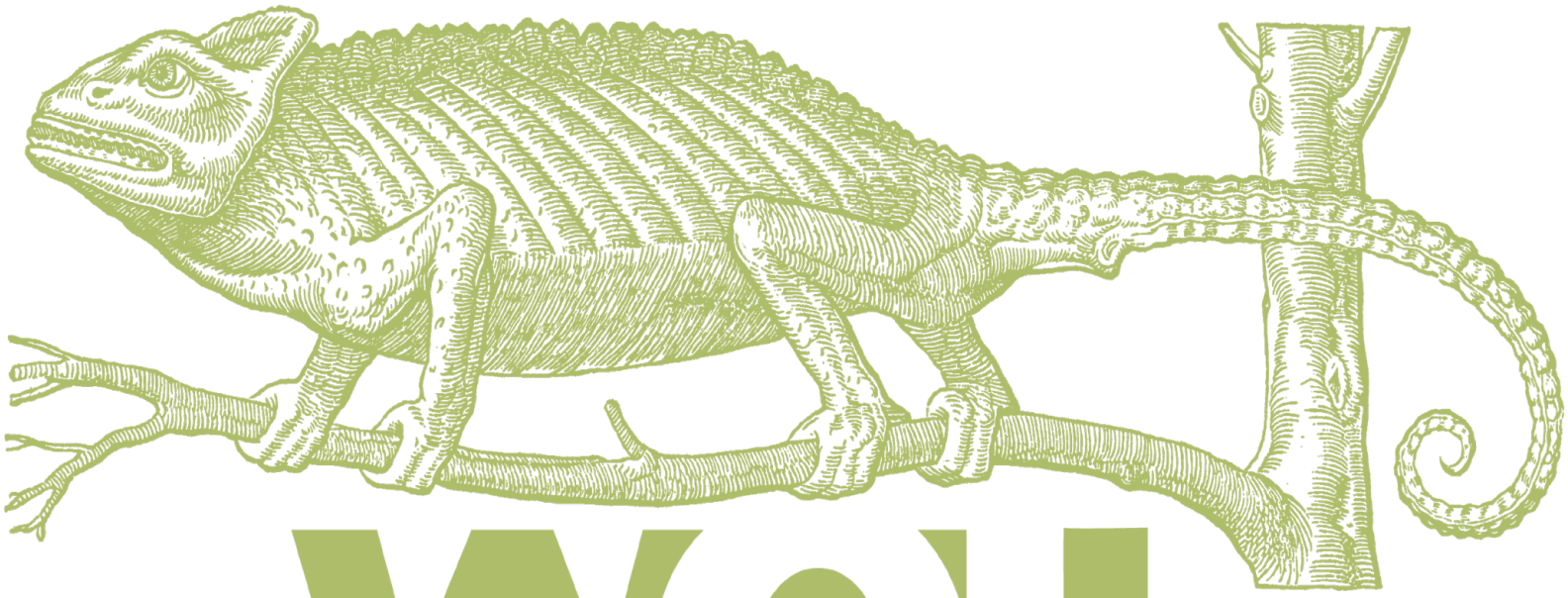
In general, WCH has a unique format. All attendees of a congress are considered members of the society, and vote at each congress to advise on the location of the next congress and members of the International Herpetological Committee (IHC) and Executive Committee (EC). Both the IHC and EC are the advisory board to guide the WCH congresses, but the organization of each congress is carried out by a local organising committee. The IHC and EC relies on feedback and expertise from the global herpetological community to guide and prioritise the actions and initiatives carried out at WCH congresses.

It is important to us to continue to ask for your advice. In the future we may ask for your advice on specific topics (e.g., call for symposia, plenary speakers, or nominations for IHC and EC members). At the moment, if you have any suggestions or comments about the format and content of WCH congresses, WCH initiatives, or an idea of content you would like to see in future newsletters, we would be delighted to receive it.

To submit advice, please e-mail it to **worldcongressofherpetology@gmail.com** with "Advice for WCH" in the subject line. Any comments will be kept confidential, and will not be identified to source. They should adhere to the WCH Code of Conduct, and they will be compiled and submitted to the EC twice a year. The IHC and EC has long relied on ingenious ideas from the herpetological community to move WCH congresses forward in new, exciting, and inclusive ways. We look forward to hearing from you!

World Congress of Herpetology Newsletter
June 2023

ISSN 2708-597X



WCH
World Congress of Herpetology

The World Congress of Herpetology (WCH) is an International Scientific Nonprofit Organization that is also a Scientific Member of the International Union of Biological Sciences (IUBS). The mission of the World Congress of Herpetology is to promote herpetological research, education, and conservation, by facilitating communication between individuals, societies, and other organisations engaged in the study of amphibians and reptiles.

The aim of the WCH newsletter is to provide a means of communication during the period between WCH congresses that are typically held every three to five years. We want it to be a means of communication between the WCH Executive Committee (EC), the International Herpetological Committee (IHC), and the global herpetological community, and a place to feature ongoing actions being taken to study amphibians and reptiles by individuals and herpetological societies globally. It will be published bi-annually in June and December.

Editorial board for newsletter 2023 4(1)

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