

# Taiwan bees- a bilingual open source checklist and digitization of Taiwan's bee fauna

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**Programme:**BIFA  
**Project ID:** BIFA6\_033  
**Project lead organization:**Taiwan Forestry Research Institute  
**Project implementation period:**1/9/2021 - 28/2/2023  
**Report approved:** 4/7/2022

## Narrative Midterm report

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### Executive Summary

Thus far we have made progress towards completing our project goals, the bulk of which will be carried out from June-September. During this first half of the funding period the largest milestones we have achieved are publishing 1232 digitized specimens on the IPT from the Taiwan Forestry Research Institute bee collection, near completion of the bee species checklist, obtaining a visa for our US collaborator and organizing plans to execute the digitization efforts in the coming months, and receiving an advance badge for participation in the biodiversity data mobilization course. Additional key objectives we have made progress on, but not yet published are collecting and barcoding efforts. We have been monitoring and evaluating our progress by video calls, email exchanges, and maintaining our data and plans in a structured format on google drive. A potential change we would like to make is disbursement of funds, as we would like to use the budget for in-country travel instead of for a flight of our US colleague, as the cost was not as significant as projected upon grant application.

## Progress against milestones

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**Has your project published at least one dataset through GBIF.org?: Yes**

**Dataset published:**

Dataset	DOI
Taiwan bees digitization	<a href="https://doi.org/10.15468/3uzuap">https://doi.org/10.15468/3uzuap</a>

**Has at least one member of your project team received certification following the BIFA capacity enhancement workshop?: Yes**

**Name of the workshop participant:**Erin Krichilsky

**Certification obtained:** Advanced Badge

## Report on Activities

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### Activity progress summary

Hereafter organized according to activity as titled above. New expected completions listed at the end of each description.

Checklist and collections visits- we have made the most progress in this category and completed steps 1 and 2 of the description and combined digitized sources and the literature to form a species level

checklist of Taiwan bee fauna. We have also validated all the names and started to add Chinese names for the species. The checklist is not yet ready for publication, but will be upon confirmation of species and additions from visiting collections in the coming months. Progress has made with regards to digitization as our US colleague is able to come to Taiwan and do that part and records from the 1950s-2011 from TFRI have been published. October 31, 2022

Analyze material- about fifty species have been photographed at TFRI, but not of all key characters. October 31, 2022

Barcoding and collecting- about 100 specimens and thirty species have been barcoded at NCYU. Though COVID has persisted globally we will be able to achieve our project goals and do barcoding in Dr. Sung's lab as well as potentially the AMNH later on if need be. There have been collecting efforts by TFRI to Hualien, Taitung, Pingtung, and NCYU to Chiayi, Kaohsiung. A new activity is that Erin took a GIS course from January-May which will help in creating species distribution maps once the fauna is digitized. December 30, 2022

Data completion and workshop- specimens from the above mentioned collecting trips have been pinned and stored in TFRI and NCYU. One TFRI dataset has been uploaded to the GBIF IPT. Erin is coming to Taiwan from June 10-August 31st, the visa has been obtained and flights have been purchased. We are still in the discussion process for hosting a workshop for bee identification, our current plan is to collaborate with TaiBIF and host a hybrid format digitization workshop in July, then in October or November host the identification workshop if we have necessary photos taken, keys made, and ideas developed over the coming months.

We are currently in the process of looking for intern students this summer, beyond those in Dr. Sung's lab already collaborating on the project, to assist in digitization. We are not yet at the publication phase, as we are still undergoing data acquisition. December 30, 2022

We are on schedule to finish our project by the end of the grant period, progress has been made in all activities, but delays in completion are due to COVID related limitations. Also, the timeline was originally structured with the thinking that one activity would happen prior to the other, but we found the most efficient way was to do certain aspects of each as time and resources were available.

## Completed activities

## Report on Deliverables

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### Deliverables progress summary

Records and species- several new records and even new species discovered from collections. A notable new record is that of *Trachusa longicornis* aff., part of a species complex and in a genus that only 1 species was previously known of in Taiwan. We also found nesting aggregations in 3 different areas of the country for *T. longicornis*, and are working on describing that along with the nests of the other species in the genus *T. formosana*. Nests are rarely found and described in bees broadly, which we are working to change. We have also found nests of an *Andrena* species, a genus that is active for short windows and the species is not one from our checklist so it is potentially new. We also discovered 1 male and 1 female of that species in TARI (Taiwan Agricultural Research Institute) with labels nearly 100 years old. We have tried to employ pan traps but due to the humidity and rain they are not as effective as net collecting, furthermore, they bias towards Halictidae. A new bumble bee was discovered and described this year. It is not yet determined if other new species will have their own publications or be part of the larger checklist write up. Expect to finish October 31, 2022

DNA barcodes- We would like to do barcoding on all 3 members of the *T. longicornis* species complex to determine if the one found in Taiwan is a new species. Thirty species have been barcoded thus far. Expect to finish December 31, 2022

Bilingual open source checklist- we have determined near 200 species in Taiwan from combining online data and mining the literature. We will further validate the list and add new information by visiting collections in the coming months. Wen-Chi Yeh has taken the lead on creating Chinese names for the species with traditional characters as used in Taiwan. October 31, 2022

Digitization- We underestimated the approximate number of records, as we have already published 1231 records of TFRI bee data alone, and that is not even all of their holdings. The other 6 collections we intend to digitize will be visited between June and September. October 31, 2022

Delays, such as starting the digitizing in May or sooner have been due to troubles getting visa and lockdowns from the pandemic.

## Communications and visibility

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Abstracts for the Entomological Society of America are due June 3rd, Erin will present. The Taiwan Entomological Society meeting is in October, Dr. Lu and Dr. Sung will present. Erin discussed this project at a departmental seminar for Columbia University. We are still working on a website and facebook page for sharing our checklist data, there are more photos to take before we can accomplish this. The decision to host an identification workshop is being discussed more in person with all colleagues in the coming months, as many of the bee groups do not have keys and we want to gauge attendee interest. No data papers have yet been published, but it is still our goal, the most likely to come first is on the new record and nesting description of *T. longicornis* (as described above), and after that the annotated bilingual checklist. All data we intend to have collected by December in order to analyze and work on publications. Our data is published publicly so it can be shared with the broader GBIF community, and we hope our publications and webpages will be shared with the stakeholders to showcase the work we have done.

## Monitoring and evaluation

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### Monitoring and evaluation findings

Short term- We have thus far been able to meet and email regularly to discuss the progress of our project, the only challenges have been covid and time zone differences. June 10-August 31 the entire team will be together in person working on using the budget and making large strides in the project. As stated above we have yet to draft any manuscripts for publication but made a lot of advancement on the checklist and should have publication ready data by the end of the year. We have uploaded data to GBIF and will do the same with our barcodes to GenBank. Our short term goals still stand though we have been unable to do things like a survey and public engagement thus far.

Long term- We also have the same long term goals, though these have yet to be seen until the projects end we look forward to implementing them.

The only changes to the project's original plans is that we may ask to reallocate some funds from flight travel to in-country travel. Reason for this change is that we will be visiting collections in Taiwan and taking transit to those localities will be costly overtime. Other than that all remains as originally stated. If that funding change is not possible we can use it as stated in our initial request. At this time we do not request guidance, but have so far had really excellent help from TaiBIF regarding our questions for the grant. We have not received feedback on the project's relevance from stakeholders, but due to the immense importance of bees for the ecosystem and food crops we welcome it. Thank you all so much for the opportunity, we look forward to finishing the work.

## Impact of COVID-19 pandemic on project implementation

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Overall, covid has had the largest impacted the project in terms of timeline. Numerous lockdowns have led to lack of data access and challenges with prioritizing this along with other projects due to limited windows of collection time. Due to these same reasons we have yet to spend any project money, but this has given us lots of time to consider next steps and ensure we are finishing swiftly and efficiently. Furthermore, obtaining a visa for our US colleague was challenging and took over a year due to border restrictions. Things are improving and we are back on schedule to finish by the end of the grant period now.

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GBIF leads the Biodiversity Information Fund for Asia (BIFA), a programme funded by the Ministry of the Environment, Government of Japan. The programme provides supplementary support for activities addressing the needs of regional researchers and policymakers through mobilization and use of biodiversity data.



