SPECIAL FEATURE

Data rescue—collection of precious and laborious in situ observed data

Dataset of forewing length of Japanese and Taiwanese butterfly species

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Abstract
Revealing how species assemblages are structured is one of the themes in community ecology and macroecology. The information of species traits as well as geographic occurrence would help analyze the pattern and process of species interactions and community assembly. Butterfly species are one of the best-studied groups about their distribution and tons of their occurrence data exist. Also, life history traits, especially interaction with host plants are well-described. However, the body size information is still poor although this is one of the most important characters affecting their distribution and life history traits. Here, we constructed a data set of the forewing length of butterflies by extracting the information from five Japanese and Taiwanese picture books. We measured 6,211 forewing lengths for a total of 524 species. Scientific, family and common names of the butterflies distributed in Japan were based on a Japanese picture book, and the other species distributed in Taiwan were based on Taiwanese picture books. Also, we added the information of butterfly names based on Binran database. Each record of butterflies is linked with the corresponding taxonomic names in the other two books to easily identify the species even when the names used in the three books and the Binran database are not the same. The dataset will be useful for basic and applied biological studies of butterflies because their forewing length is a proxy of their body size and dispersal ability, which could be important determinants of their physiology, distribution, ecosystem functioning and evolution.

The complete data set for this abstract published in the Data Paper section of the journal is available in electronic format in MetaCat in JaLTER at http://db.cger.nies.go.jp/JaLTER/metacat/metacat/ERDP-2020-11.1/jalter-en.

KEYWORDS
body size, Lepidoptera, life history, literature study, macroecology

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1 | INTRODUCTION

In community ecology and macroecology, to reveal how species assemblages are structured is one of the central themes. It is recognized that use of functional traits is a powerful approach to infer the processes and mechanisms of species interactions and community assembly (Moretti et al., 2017). Recent developments of trait-based approaches to community ecology using archived data sets emphasize the importance of life history traits (e.g., Hishi, Fujii, Saitoh, Yoshida, & Hasegawa, 2019). Above all, body size is one of the most fundamental traits that interact with metabolism, dispersal, and distribution of each species (Brown & Maurer, 1989).

Butterfly species is one of the best-studied taxonomic groups about their distribution, and tons of their occurrence data exist (Hirao, Kubota, & Murakami, 2015; Nakadai, Hashimoto, Iwasaki, & Sato, 2018). Also, life history traits, especially interaction with host plants are well described (Saito, Jinbo, Yago, Kurashima, & Ito, 2016). Thus, butterfly can be an ideal group for testing hypotheses about community ecology and macroecology. However, the body size information is still poor although this is one of the most important characters affecting their distribution and life history traits. Especially, no similar dataset exists at least in Asia despite the large number of Asian butterfly species. Since Asian butterflies are among the most well-described butterflies in the world in terms of their biological information, body size information is more useful in Asia than in other regions where basic biological information of butterflies is not enough yet.

The aim of this data paper is to provide forewing length data for Japanese and Taiwanese butterflies as an important proxy of body size, extracted from published picture books. Forewing length can be regarded as an indicator of body size, which may constraint physiological parameters, such as resource exploitation and requirement (Hashimoto & Ohgushi, 2017), tolerance to environmental stresses (Clissold & Simpson, 2015), and dispersal ability (Chai & Srygley, 1990). Specifically, if researchers combined the information of this data paper with monitoring and census datasets including butterfly as a targeted taxa (e.g., the censuses of the National Survey of the Natural Environment and the Monitoring Sites 1,000 Project by the Ministry of the Environment in Japan), this data would provide opportunities to test biodiversity patterns across time and space (e.g., Nakadai et al., 2018; Nakadai, Nyman, Hashimoto, Iwasaki, & Valtonen, 2020). For example, the impact of climate change on geographical and phenological patterns of butterfly body size at the community-level can be tested. Thus, this dataset has fundamental information for researchers who study butterflies in community ecology and macroecology.

2 | DATA DESCRIPTION

2.1 | Identifier

ERDP-2020-11

2.2 | Contributor

2.2.1 | Dataset owner

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2.3 | Projects

2.3.1 | Titles

1. Grant-in-Aid for JSPS Research Fellow (no. 15 J00601, 18J00093).

2.3.2 | Personnel

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2.3.3 | Funding

Japan Society for the Promotion of Science.

2.4 | Geographic coverage

Japan (20°–46°N, 123°–154°E) and Taiwan (22°–25°N, 120°–122°E)

2.5 | Temporal coverage

Until 2013.

2.6 | Taxonomic coverage

Butterfly (Lepidoptera).

2.7 | Methods

2.7.1 | Data collection

We compiled wing data on 524 species using three published illustrations (Hsu, 2013a, 2013b, 2013c; Shirôzu, 1960, 2006). We used Image J software (Abramoff, Magalhães, & Ram, 2004) to extract forewing lengths (in mm) from plates that included scale bars. All of forewing lengths were extracted with the described information of their sex and locality where they were collected, except for the pictures which do not include abdomen. Forewing length is length between central joint with abdomen to the top of forewing (Shirôzu, 2006). We basically chose a wing on the right of each picture. If the right one could not be measured, we choose the left one.

Taxonomic names of Japanese and Taiwanese butterflies are based on Shirôzu (2006) and Hsu (2013a, 2013b, 2013c), respectively. Also, we put the column of butterfly names based on Binran (Inomata, Uémura, Yago, Jinbo, & Ueda, 2010–2013), which are used in the previous data paper of host plant of Japanese butterflies (Saito et al., 2016). Each record of butterflies is linked with the corresponding taxonomic names in the other two books to easily identify the species even when the names used in the three books are not the same.

The data includes 6,211 forewing lengths for total 524 species (Papilionidae, Pieridae, Lycaenidae, Nymphalidae, Hesperiidae) finally, and the forewing lengths are 25.8 ± 11.93 mm (mean ± standard deviation).

2.8 | Data structure

2.8.1 | Dataset files

The dataset consists of three files, “Forewing_length.csv,” “Name_list.csv” and “Reference.csv” (Table 1).
**Table 1** The list of data files compiled in this study

| Dataset name   | Data file name          | Description                                                                 |
|---------------|-------------------------|------------------------------------------------------------------------------|
| Forewing_length | Forewing_length.csv     | A list of butterfly species with forewing length and records of original references |
| Name_list      | Name_list.csv           | A list of butterfly species which includes three types of names based on Shirōzu (1960, 2006), Hsu (2013a, 2013b, 2013c) and Binran (Inomata et al. 2010–2013) |
| Reference      | Reference.csv           | A list of original references                                               |

**Table 2** The detailed description for columns in three files, “Forewing_length.csv,” “Name_list.csv,” and “Reference.csv”

| Data file name       | Contents name               | Description                                                                 | Note                                                   |
|----------------------|-----------------------------|----------------------------------------------------------------------------|--------------------------------------------------------|
| Forewing_length.csv  | Specimen_ID                 | Specimen ID to recognize each individual                                   | Character                                              |
|                      | Species_name_adopted        | Species name of butterfly adopted in this article                          | Character                                              |
|                      | Original_Family             | Original family name of butterfly in literature                            | Character                                              |
|                      | Original_Genus              | Original genus name of butterfly in literature                             | Character                                              |
|                      | Original_Specific_name      | Original specific name of butterfly in literature                          | Character                                              |
|                      | Original_Subspecies         | Original subspecies name of butterfly in literature                        | Character                                              |
|                      | Original_Species_name       | Original species name of butterfly in literature                           | Character                                              |
|                      | Original_Japanese_name      | Original Japanese common name of butterfly in literature                   | Japanese character (two-byte character)                |
|                      | Sex                         | Sex of butterfly                                                           | Character                                              |
|                      | Forewing_length             | Forewing length of butterfly species (in mm)                               | Numeric                                                |
|                      | References                  | Literature citation(s) in referencedb.txt                                  | Character                                              |
|                      | Additional_infor_on_pics    | Additional information related to specimen origin on the picture books     | Character                                              |
|                      | Japanese_name               | Species name of butterfly in Japanese                                      | Japanese character (two-byte character)                |
|                      | Genus_Shirozu_2006          | Genus name of butterfly in Shirōzu (2006)                                  | Character                                              |
|                      | Specific_name_Shirozu_2006  | Specific name of butterfly in Shirōzu (2006)                               | Character                                              |
|                      | Subspecies_Shirozu_2006     | Subspecies name of butterfly in Shirōzu (2006)                             | Character                                              |
|                      | Scientific_name_Shirozu_2006| Scientific name including subspecies name of butterfly in Shirōzu (2006)  | Character                                              |
|                      | Genus_Hsu_2013              | Genus name of butterfly in Hsu (2013a, 2013b, 2013c)                       | Character                                              |
|                      | Specific_name_Hsu_2013      | Specific name of butterfly in Hsu (2013a, 2013b, 2013c)                    | Character                                              |
|                      | Subspecies_Hsu_2013         | Subspecies name of butterfly in Hsu (2013a, 2013b, 2013c)                 | Character                                              |
|                      | Scientific_name_Hsu_2013    | Scientific name including subspecies name of butterfly in Hsu (2013a, 2013b, 2013c) | Character                                              |

(Continues)
| Data file name                  | Contents name                          | Description                                                                 | Note                        |
|--------------------------------|----------------------------------------|------------------------------------------------------------------------------|-----------------------------|
| Genus_Shirozu_1960            | Genus name of butterfly in Shirôzu (1960) | Character                                                                   |                             |
| Specific_name_Shirozu_1960    | Specific name of butterfly in Shirôzu (1960) | Character                                                                   |                             |
| Subspecies_Shirozu_1960       | Subspecies name of butterfly in Shirôzu (1960) | Character                                                                   |                             |
| Scientific_name_Shirozu_1960  | Scientific name including subspecies name of butterfly in Shirôzu (1960) | Character                                                                   |                             |
| Genus_Binran                  | Genus name of butterfly in Binran       | Character                                                                   |                             |
| Specific_name_Binran           | Specific name of butterfly in Binran    | Character                                                                   |                             |
| Subspecies_Binran             | Subspecies name of butterfly in Binran  | Character                                                                   |                             |
| Scientific_name_Binran        | Scientific name including subspecies name of butterfly in Binran | Character                                                                   |                             |
| Japanese_name_Binran          | Species name of butterfly in Japanese in Binran | Japanese character (two-byte character)                                    |                             |
| Specimen_locality_Japanese    | Locality of specimen in Japanese        | Japanese and Chinese characters (two-byte character)                        |                             |
| Specimen_locality_Romaji      | Locality of specimen in Hepburn romanization | Character                                                                 |                             |
| Remarks                       | Additional information related to taxonomy |                                                                                         | Character                   |
| Name_list.csv                 | Species_name_adopted                   | Species name of butterfly adopted in this article                           | Character                   |
| Family_name                   | Family name of butterfly               | Character                                                                   |                             |
| Japanese_name                 | Species name of butterfly in Japanese  | Japanese character (two-byte character)                                    |                             |
| Genus_Binran                  | Genus name of butterfly in Binran       | Character                                                                   |                             |
| Specific_name_Binran           | Specific name of butterfly in Binran    | Character                                                                   |                             |
| Subspecies_Binran             | Subspecies name of butterfly in Binran  | Character                                                                   |                             |
| Scientific_name_Binran        | Scientific name including subspecies name of butterfly in Binran | Character                                                                   |                             |
| Japanese_name_Binran          | Species name of butterfly in Japanese in Binran | Japanese character (two-byte character)                                    |                             |
| Genus_Shirozu_2006            | Genus name of butterfly in Shirôzu (2006) | Character                                                                   |                             |
| Specific_name_Shirozu_2006    | Specific name of butterfly in Shirôzu (2006) | Character                                                                   |                             |
| Subspecies_Shirozu_2006       | Subspecies name of butterfly in Shirôzu (2006) | Character                                                                   |                             |
| Scientific_name_Shirozu_2006  | Scientific name including subspecies name of butterfly in Shirôzu (2006) | Character                                                                   |                             |
| Genus_Hsu_2013                | Genus name of butterfly in Hsu (2013a, 2013b, 2013c) | Character                                                                   |                             |
| Specific_name_Hsu_2013        | Specific name of butterfly in Hsu (2013a, 2013b, 2013c) | Character                                                                   |                             |
| Subspecies_Hsu_2013           | Subspecies name of butterfly in Hsu (2013a, 2013b, 2013c) | Character                                                                   |                             |
| Scientific_name_Hsu_2013      | Scientific name including subspecies name of butterfly in Hsu (2013a, 2013b, 2013c) | Character                                                                   |                             |
2.8.2 | File format

The data tables are prepared as comma-delimited text files encoded in UTF-8.

2.8.3 | Data table descriptions

Here, we show the detailed description for each column in the files (Table 2).

2.9 | Accessibility

2.9.1 | License and usage rights

The dataset is published under the Creative Commons License Attribution-ShareAlike 4.0 (CC BY-SA, https://creativecommons.org/licenses/by-sa/4.0/ Accessed August 31, 2019).

2.9.2 | Storage location

http://db.cger.nies.go.jp/JaLTER/metacat/metacat/ERDP-2020-11.1/jalter-en.

2.10 | Publications

Nakadai R., Hashimoto K., Iwasaki T., & Sato Y. (2018). Geographical co-occurrence of butterfly species: the importance of niche filtering by host plant species. *Oecologia*, 186, 995–1005.

Nakadai R., Nyman T., Hashimoto K., Iwasaki T., & Valtonen A. (2020). Climate, species richness, and body size drive geographical variation in resource
specialization of herbivorous butterflies. *bioRxiv*. doi: https://doi.org/10.1101/2020.01.09.899922

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**CONFLICT OF INTERESTS**

The authors declare no potential conflict of interest.

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Nakadai, R., Nyman, T., Hashimoto, K., Iwasaki, T., & Valtonen, A. (2020). Climate, species richness, and body size drive geographical variation in resource specialization of herbivorous butterflies. *bioRxiv*. https://doi.org/10.1101/2020.01.09.899922

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