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Abstract

Background

Dokdo, an island toward the East Coast of South Korea, comprises 89 small islands. Dokdo is a volcanic island created by a volcanic eruption that promoted the formation of Ulleungdo (located in the East sea), which is ~87.525 km away from Dokdo. Dokdo is an important island because of geopolitics; however, because of certain investigation barriers such as weather and time constraints, the awareness of its insect fauna is less compared to that of Ulleungdo. Dokdo’s insect fauna was obtained as 10 orders, 74 families, and 165 species until 2017; subsequently, from 2018 to 2019, 23 unrecorded species were discovered via an insect survey.

New information

As per a recent study, the database of insect species on Dokdo has been identified as 10 orders, 81 families, 188 species, and 23 undetermined species. This database has been registered to the Global Biodiversity Information Facility (GBIF; www.GBIF.org), and is the first record for Dokdo’s insect fauna.

Keywords

Biodiversity, Dokdo, insect fauna, newly recorded species, insect database
Introduction

An island is known for its ecologically and biologically important ecosystem. Because of its geographical isolation, the movement of organisms is limited (Franks 2009). Moreover, these island-like areas have low potential for both species transfer and settlement; therefore, they have low biodiversity because of the small land area. Furthermore, island-like areas are vulnerable to external intrusions, which is a major threat to indigenous species (Kil et al. 2006). However, because of recent developments in traffic pathways, isolated island ecosystems that are in isolation have decreased, thus allowing researchers to investigate the interactions between evolutionary and ecological processes that are responsible for biodiversity (Gillespie et al. 2008).

The Intergovernmental Panel on Climate Change (IPCC) report shows that climate change is causing the level and temperature of sea to rise; if this trend continues, most coastal regions around the world would be at risk (Hong 2010, IPCC 2014). By 2100, these increases in sea level were estimated to be at least 1 m, and the flooding-related risk for large parts of the low-land island ecosystem was high, which could lead to significant habitat loss for many organisms worldwide (Bellard et al. 2013). The average annual sea level in Korean coastlines has been rising since 1989, and the average annual rate of sea level rise (5.67 mm/yr) around Ulleungdo has been very quick (Korea Hydrographic and Oceanographic Agency 2020).

Dokdo belongs to an administrative district that includes Ulleungdo. However, tourists cannot stay for more than 30 min in Dokdo, although the Korean Coast Guard (KCG) and some residents can stay for a longer time period. Dokdo has an island ecosystem that is relatively disconnected from the outside; therefore, it is an important subject for island ecology and biogeography because the entire island is composed of volcanic rocks (Cultural Heritage Administration 2009). Dokdo was formed by an underwater volcanic eruption during The Pliocene between 2.5 and 4.6 million years ago. It has since been known to promote the formation of Ulleungdo volcanoes via a tectonic plate movement (Lee et al. 2002, Raman et al. 2016). Dokdo, is built on the sea floor that is ~2,000 m deep, comprises two main volcanic islands and 89 small islands (Sohn 1995, Ryu et al. 2012). The nearest land area to Dokdo is Jukbyeon, Uljin-gun, Gyeongsangbuk-do, which is 217.149 km away from Dokdo and 87.525 km from Ulleungdo (Hwang and Park 2007).

Furthermore, Dokdo is located at 131°52’10.4” E and 37°14’26.8” N; the address of Korean administrative district is 1-96 Dokdo-ri, Ulleung-eup, Ulleung-gun, Gyeongsangbuk-do, Korea. In 1982, Dokdo was designated as Natural Monument No. 336 by the Korea Cultural Heritage Administration (KCHA) and was managed by Dokdo Natural Reserve. Dokdo was a very small island with an area of 187,554 m²; however, there is extremely limited awareness of its insect fauna because it has been a protected island and has inaccessible geographical features. Dokdo is located at the bridge that connects Ulleungdo in Korea and Oki Island in Japan. Since the previous investigation for insect species on the
island played a vital role in the biogeographic limit, the study of insect fauna on Dokdo is considered to be geographically important (Yasunaga and Duwal 2015).

After the initial study of insects on Dokdo by Jolivet in 1974, many researchers have conducted studies and by 2017 10 orders, 74 families, and 165 species of insects have been identified (Jolivet 1974, Yoon 1978, Lee and Kwon 1981, Kwon et al. 1996, An 2000, Korean Ministry of Environment 2001, Ulleung Research Institute of Gyeongju University 2004, Park and Suh 2005, Kim and Yeom 2006, An 2008, Kim et al. 2009, Lee et al. 2009, Park et al. 2010, Park et al. 2011, Park et al. 2013, Daegu Regional Environmental Office 2012, Daegu Regional Environmental Office 2016, Choi et al. 2015, Park et al. 2017, Hwang et al. 2017). In this study, we newly identified 23 unrecorded species on the island and reported an updated database.

**Sampling methods**

**Study extent:** In this study, between September 2017 and September 2018, we collected samples four times from Dokdo-Anyongbok-gil, Ulleung-eup, Ulleung-gun, Gyeongsangbuk-do, Korea (131°52'03.2''E, 37°14'27.2'N) using sweeping, beating, brandishing, black light traps, and pit-fall traps. The survey was divided into East (Dongdo) and West (Seodo) using terrain isolation (Fig. 1).

**Sampling description:** In Dongdo, we performed sample collection along the slope leading from Marina, through the KCG facility, and then to the old Marina. In Seodo, we performed the sample collection along a very steep slope leading to the fishermen's dormitory. Note that Seodo had less vegetation distribution compared to Dongdo.

We stored the collected specimen samples in 70% ethanol or conical tubes. Then, we transferred them to the animal systematics and taxonomy laboratory and pest control laboratory at Kyungpook National University, Korea. The samples were then identified using the national species list of Korea (National Institute of Biological Resources 2019).

**Database update:** We created a new checklist by adding 23 newly confirmed insect species with reference to the previous reports and compiled it into a database. The data have been registered to the GBIF.

**Geographic coverage**

**Description:** The survey was divided into Dongdo and Seodo.

**Coordinates:** 37-14 Latitude; 131-52 and 131-51 longitude.

**Taxonomic coverage**

Taxa included:
| Rank   | Scientific Name | Common Name |
|--------|-----------------|-------------|
| kingdom| Animalia        | Animals     |
| phylum | Arthropoda      | Arthropods  |
| class  | Insecta         | Insects     |
| order  | Blattodea       |             |
| family | Ectobiidae      |             |
| order  | Coleoptera      |             |
| family | Aphodidae       |             |
| family | Carabidae       |             |
| family | Chrysomelidae   |             |
| family | Coccinellidae   |             |
| family | Curculionidae    |             |
| family | Elateridae      |             |
| family | Endomychidae    |             |
| family | Hydrophilidae   |             |
| family | Latridiidae     |             |
| family | Mordellidae     |             |
| family | Nitidulidae     |             |
| family | Oedemeridae     |             |
| family | Scirtidae       |             |
| family | Staphylinidae   |             |
| family | Tenebrionidae   |             |
| order  | Dermaptera      |             |
| family | Anisolabididae  |             |
| family | Forficulidae    |             |
| order  | Diptera         |             |
| family | Anthomyiidae    |             |
| family | Calliphoridae   |             |
| family | Ceratopogonidae |             |
| family | Chironomidae    |             |
| family | Chloropidae     |             |
| Family       | Order       |
|--------------|-------------|
| Coelopidae   |            |
| Culicidae    |            |
| Drosophilidae|            |
| Muscidae     |            |
| Phoridae     |            |
| Psychodidae  |            |
| Rhiniidae    |            |
| Sarcophagidae|            |
| Scathophagidae|          |
| Sepsidae     |            |
| Syrphidae    |            |
| Tephritidae  |            |
| Tipulidae    |            |
| Hemiptera    |            |
| Alydidae     |            |
| Anthocoridae |            |
| Aphididae    |            |
| Cicadellidae |            |
| Cydnidae     |            |
| Delphacidae  |            |
| Lygaeidae    |            |
| Miridae      |            |
| Nabidae      |            |
| Pentatomidae |            |
| Piesmatidae  |            |
| Rhopalidae   |            |
| Rhyparochromidae |      |
| Scutelleridae|            |
| Tingidae     |            |
| Triozidae    |            |
| Hymenoptera  |            |
| Family | Order       |
|--------|-------------|
| Bethylidae | Neuroptera |
| Braconidae | Neuroptera |
| Chalcididae | Neuroptera |
| Eupelmidae | Neuroptera |
| Formicidae | Neuroptera |
| Ichneumonidae | Neuroptera |
| Pteromalidae | Neuroptera |
| Lepidoptera | Lepidoptera |
| Crambidae | Orthoptera |
| Erebididae | Orthoptera |
| Geometridae | Orthoptera |
| Hesperidae | Orthoptera |
| Lycaenidae | Orthoptera |
| Noctuidae | Orthoptera |
| Nymphalidae | Orthoptera |
| Papilionidae | Orthoptera |
| Plutellidae | Orthoptera |
| Pyralidae | Orthoptera |
| Sphingidae | Orthoptera |
| Tortricidae | Orthoptera |
| Yponomeutidae | Orthoptera |
| Lepidoptera | Orthoptera |
| Crambidae | Neuroptera |
| Erebidae | Neuroptera |
| Geometridae | Neuroptera |
| Hesperidae | Neuroptera |
| Lycaenidae | Neuroptera |
| Noctuidae | Neuroptera |
| Nymphalidae | Neuroptera |
| Papilionidae | Neuroptera |
| Plutellidae | Neuroptera |
| Pyralidae | Neuroptera |
| Sphingidae | Neuroptera |
| Tortricidae | Neuroptera |
| Yponomeutidae | Neuroptera |
| Aeshnidae | Odonata |
| Coenagrionidae | Odonata |
| Libellulidae | Odonata |
| Orthoptera | Orthoptera |
| Gryllacrididae | Orthoptera |
family Gryllidae
family Mogoplistidae

Usage licence

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Data resources

Data package title: dokdo insect list, 1974-2019
Resource link: https://doi.org/10.15468/h684as
Number of data sets: 1
Data set name: dokdo_insect_list_1974-2019
Download URL: https://www.gbif.org/dataset/eb47a0de-862f-44c0-be42-0e300abaaab4
Data format: CSV.

| Column label                  | Column description                                                                 |
|-------------------------------|------------------------------------------------------------------------------------|
| occurrenceID                 | Unique identifier of the occurrence                                               |
| basisOfRecord                | State of the recorded specimen                                                    |
| eventDate                    | Date of the data registration                                                     |
| institutionCode              | Abbreviation of the institution having custody of the object                      |
| scientificName               | Full scientific name                                                               |
| ScientificNameAuthorship     | The authorship information for the scientificName formatted according to the      |
|                              | conventions of the applicable nomenclaturalCode                                   |
| collectionCode               | Abbreviation of specimen or database                                               |
| decimalLatitude              | Geographic latitude of the collection site                                         |
| decimalLongitude             | Geographic longitude of the collection site                                        |
| coordinateUncertaintyInMeters| The horizontal distance (in metres) from the given decimalLatitude and            |
|                              | decimalLongitude describing the smallest circle containing the whole of the Location|
| countryCode                  | Country code                                                                       |
| Identification Date          | Date for identifying the specimen                                                 |
| Identified by                 | Identifier for the specimen                                                       |
Additional information

Result and Discussion

In this study, we created the initial database based on the results of a survey of insects on Dokdo from 1974 to 2017. Moreover, the checklist was confirmed that 10 orders, 74 families, 165 species, and 23 undetermined species of insects distributed on the island were identified.

In this study, the previously recorded 23 insect species were collected in Dokdo. The species are as follows: ten species in the Order Hemiptera (Leptocorisa chinensis, Batracomorphus diminuta, Macrostelus striifrons, Recilia coronifera, Geotomus convexus, Creontiades coloripes, Nesidiocoris tenuis, Glaucias subpunctatus, Liorhyssus hyalinus, Horridipamera inconspicua); two species in the Order Coleoptera (Aphodius urostigma and Nacerdes melanura); ten species in the Order Diptera (Dasysyrphus bilineatus, Scaeva komabensis, Sepsis monostigma, Lucilia porphyrina, Stomorhina obsoleta, Sarcophaga brevicornis, Sarcophaga peregrina, Atherigona oryzae, Orchisia costata, and Culicoides circumscriptus); and one species in the Order Lepidoptera (Vanessa indica) (Fig. 2).

In addition to the 23 newly unrecorded species in Dokdo, four undetermined species were identified to the genus stage: Empoasca sp. in Family Cicadellidae; Sisyra sp. in Family Sisyridae. Furthermore, five of the 23 unrecorded species and one of the four unidentified species belong to newer families; note that a total of six families were newly added. Finally, we confirmed the updated database of insect fauna on Dokdo: 10 orders, 81 families, 188 species, and 23 unidentified species (Table 1).

Among the 23 unrecorded species on Dokdo, B. diminutus was first discovered in Korea, and the remainder of the species was recorded in the Korean peninsula. In this study, C. circumscriptus, which is known for being extremely annoying and sucking blood KCG and residents, has been identified for the first time in Dokdo using Black light trap with dry ice.

The 40 undetermined species that have been identified up to the genus stage are classified as unrecorded or new species in Korea. Because of geographical characteristics, studying these insects is considered to be very important to understand Dokdo’s biodiversity.
Conflicts of interest

The authors declare that there is no conflicts of interest.

Acknowledgements

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Figure 1.
Map of Dokdo, East(Dongdo) and West (Seodo) islands.
Figure 2.

Newly recorded insect species on island Dokdo. **A** Creontiades coloripes **B** Nesidiocoris tenuis **C** Liorhyssus hyalinus **D** Horridipamera inconspicua **E** Geotomus convexus **F** Glaucias subpunctatus **G** Leptocoris chinensis **H** Recilia coronifera **I** Macrosteles striifrons **J** Batracomorphus diminuta **K** Nacerdes melanura **L** Dasysyrphus bilineatus **M** Scaeva komabensis **N** Sepsis monostigma **O** Lucilia porphyrina **P** Stomorhina obsoleta **Q** Sarcophaga brevicornis **R** Sarcophaga peregrina **S** Atherigona oryzae **T** Orchisia costata **U** Vanessa indica **V** Aphodius urostigma **W** Culicoides circumspectus. Scale bars: **F**, **G**, **L**, **M**, **R**, **U** = 2.0 mm; **A**, **C**, **D**, **K**, **O**, **P**, **Q** = 1.0 mm; **B**, **E**, **H**, **I**, **J**, **N**, **S**, **T**, **V**, **W** = 0.5 mm.
Table 1.
The updated database of insect species on Dokdo from the year 1974 to 2019.

| Order            | Family               | Scientific Name                  | Newly recorded species | Undetermined name |
|------------------|----------------------|----------------------------------|------------------------|-------------------|
| Blattodea        | Ectobiidae           | *Blattella nipponica*            |                        |                   |
| Coleoptera       | Aphodiidae           | *Aphodius urostigma*             |                        | O                 |
| Coleoptera       | Carabidae            | *Anisodactylus signatus*         |                        |                   |
| Coleoptera       | Carabidae            | *Anisodactylus tricuspidatus*    |                        |                   |
| Coleoptera       | Carabidae            | *Dolichus halensis*              |                        |                   |
| Coleoptera       | Carabidae            | *Harpalus jureceki*              |                        |                   |
| Coleoptera       | Carabidae            | *Harpalus sinicus*               |                        |                   |
| Coleoptera       | Carabidae            | *Stenolophus difficilis*         |                        |                   |
| Coleoptera       | Chrysomelidae        | *Callosobruchus chinensis*        |                        |                   |
| Coleoptera       | Chrysomelidae        | *Cassida nebulosa*               |                        |                   |
| Coleoptera       | Chrysomelidae        | *Cassida piperata*               |                        |                   |
| Coleoptera       | Chrysomelidae        | *Longitarsus succineus*          |                        |                   |
| Coleoptera       | Chrysomelidae        | *Psylliodes punctifrons*         |                        |                   |
| Coleoptera       | Chrysomelidae        | *Thlaspida biramosa*             |                        |                   |
| Coleoptera       | Coccinellidae        | *Coccinella septempunctata*      |                        |                   |
| Coleoptera       | Coccinellidae        | *Harmonia axyridis*              |                        |                   |
| Coleoptera       | Coccinellidae        | *Harmonia yedoensis*             |                        |                   |
| Coleoptera       | Coccinellidae        | *Propylea japonica*              |                        |                   |
| Coleoptera       | Coccinellidae        | *Scymnus (Neopullus) babai*      |                        |                   |
| Coleoptera       | Coccinellidae        | *Scymnus ferrugatus*             |                        |                   |
| Coleoptera       | Coccinellidae        | *Scymnus sp.*                    |                        | O                 |
| Order          | Family       | Species                                      | Status |
|---------------|-------------|----------------------------------------------|--------|
| Coleoptera    | Curculionidae| Auleutes sp.                                  | O      |
| Coleoptera    | Curculionidae| Cosmobaris scolopacea                         |        |
| Coleoptera    | Curculionidae| Ceutorhynchus albosuturalis                   |        |
| Coleoptera    | Curculionidae| Dermentes tessellatocollis                    |        |
| Coleoptera    | Curculionidae| Rhinoncus cribricollis                       |        |
| Coleoptera    | Curculionidae| Rhinoncus jakovlevi                          |        |
| Coleoptera    | Curculionidae| Scepticus insularis                           |        |
| Coleoptera    | Curculionidae| Scepticus uniformis                          |        |
| Coleoptera    | Curculionidae| Sitona lineatus                               |        |
| Coleoptera    | Elateridae   | Agrypnus miyamontoi                           |        |
| Coleoptera    | Elateridae   | Melanotus castanipes                          |        |
| Coleoptera    | Elateridae   | Melanotus cete                                |        |
| Coleoptera    | Elateridae   | Pectocera fortunei                            |        |
| Coleoptera    | Endomychidae | Ancylopus melanocephalus                      |        |
| Coleoptera    | Endomychidae | Ancylopus pictus asiaticus                    |        |
| Coleoptera    | Hydrophilidae| Hydrophilus acuminatus                        |        |
| Coleoptera    | Latridiidae  | Cortinicara gibbosa                           |        |
| Coleoptera    | Latridiidae  | Stephostethus chinensis                       |        |
| Coleoptera    | Mordellidae  | Mordella sp.                                  | O      |
| Coleoptera    | Mordellidae  | Mordella tokejii                              |        |
| Coleoptera    | Nitidulidae  | Omosita colon                                 |        |
| Coleoptera    | Nitidulidae  | Omosita japonica                              |        |
| Coleoptera    | Oedemeridae  | Nacerdes melanura                             | O      |
| Coleoptera    | Scirtidae    | Cyphon sp.                                    | O      |
| Coleoptera    | Staphylinidae| Aleochara fucicola                            |        |
| Coleoptera    | Staphylinidae| Atheta sp.                                    | O      |
| Insecta  | Family         | Genus          | Species          |
|---------|----------------|----------------|------------------|
| Coleoptera | Staphylinidae | Atheta tokiokai |                  |
| Coleoptera | Staphylinidae | Cafius histrio |                  |
| Coleoptera | Staphylinidae | Neobisnius sp. | O                |
| Coleoptera | Staphylinidae | Paederus fuscipes |              |
| Coleoptera | Tenebrionidae | Gonocephalum coenosum | |
| Coleoptera | Tenebrionidae | Gonocephalum coriaceum | |
| Dermaptera | Anisolabididae | Anisolabis maritima | |
| Dermaptera | Anisolabididae | Euborellia annulipes | |
| Dermaptera | Forficulidae | Forficula scudderi | |
| Diptera | Anthomyiidae | Delia platura | |
| Diptera | Anthomyiidae | Fucellia apicalis | |
| Diptera | Anthomyiidae | Fucellia boninensis | |
| Diptera | Anthomyiidae | Pegomya cunicularea | |
| Diptera | Calliphoridae | Calliphora nigrabarbis | |
| Diptera | Calliphoridae | Hemipyrellia liguriens | |
| Diptera | Calliphoridae | Lucilia illustris | |
| Diptera | Calliphoridae | Lucilia porphyrina | O |
| Diptera | Calliphoridae | Lucilia sericata | |
| Diptera | Ceratopogonidae | Culicoides circumscribut | O |
| Diptera | Chironomidae | Polypedilum sp. | O |
| Diptera | Chloropidae | Thaumatomyia notata | |
| Diptera | Coelopidae | Coelopa frigida | |
| Diptera | Culicidae | Culex orientalis | |
| Diptera | Culicidae | Ochlerotatus togoi | |
| Diptera | Drosophilidae | Drosophila sp. | O |
| Diptera | Muscidae | Atherigona oryzae | O |
| Order       | Family     | Species                  |
|-------------|------------|--------------------------|
| Diptera     | Muscidae   | Musca bezzi              |
| Diptera     | Muscidae   | Musca hervei             |
| Diptera     | Muscidae   | Orchisia costata         |
| Diptera     | Phoridae   | Megaselia spiracularis   |
| Diptera     | Psychodidae| Psychoda alternata       |
| Diptera     | Psychodidae| Tinearia alternata       |
| Diptera     | Rhiniidae  | Stomorhina obsoleta      |
| Diptera     | Sarcophagida| Sarcophaga brevicornis   |
| Diptera     | Sarcophagida| Sarcophaga melanura     |
| Diptera     | Sarcophagida| Sarcophaga peregrina    |
| Diptera     | Scathophagida| Scathophaga stercoraria |
| Diptera     | Sepsidae   | Sepsis monostigma       |
| Diptera     | Syrphidae  | Allobaccha apicalis      |
| Diptera     | Syrphidae  | Allograpta javana        |
| Diptera     | Syrphidae  | Betasyrphus serarius     |
| Diptera     | Syrphidae  | Dasysyrphus bilineatus   |
| Diptera     | Syrphidae  | Episyrsphus balteatus    |
| Diptera     | Syrphidae  | Eristalis cerealis       |
| Diptera     | Syrphidae  | Eristalis tenax          |
| Diptera     | Syrphidae  | Metasyrphus corollae     |
| Diptera     | Syrphidae  | Metasyrphus nitens       |
| Diptera     | Syrphidae  | Scaeva komabensis        |
| Diptera     | Syrphidae  | Melanostoma mellinum     |
| Diptera     | Syrphidae  | Sphaerophoria menthastri |
| Diptera     | Syrphidae  | Xanthandrus comtus       |
| Diptera     | Tephritidae| Campiglossa sada         |
| Taxonomy | Family | Species               | Status |
|----------|--------|-----------------------|--------|
| Diptera  | Tephritidae | Campiglossa sp.        | O      |
| Diptera  | Tephritidae | Ensina sonchi         |        |
| Diptera  | Tephritidae | Trupanea convergens    |        |
| Diptera  | Tipulidae  | Tipula sp.             | O      |
| Hemiptera| Alydidae  | Leptocorisa chinensis  | O      |
| Hemiptera| Anthocoridae| Orius sauteri        |        |
| Hemiptera| Anthocoridae| Orius sp.             | O      |
| Hemiptera| Aphididae  | Aphis nerii           |        |
| Hemiptera| Aphididae  | Aphis rumicis         |        |
| Hemiptera| Cicadellidae| Balclutha rubrinervis |        |
| Hemiptera| Cicadellidae| Batracomorphus diminuta| O      |
| Hemiptera| Cicadellidae| Empoasca sp.1         | O      |
| Hemiptera| Cicadellidae| Empoasca sp.2         | O      |
| Hemiptera| Cicadellidae| Hishimonus sellatus   |        |
| Hemiptera| Cicadellidae| Laburrus impictifrons |        |
| Hemiptera| Cicadellidae| Macrosteles striifrons| O      |
| Hemiptera| Cicadellidae| Maiestas oryzae       |        |
| Hemiptera| Cicadellidae| Psammotettix striatus |        |
| Hemiptera| Cicadellidae| Recilia coronifera    | O      |
| Hemiptera| Cydnidae   | Geotomus pygmaeus     |        |
| Hemiptera| Cydnidae   | Geotomus convexus     | O      |
| Hemiptera| Delphacidae| Laodelphax striatellus|        |
| Hemiptera| Delphacidae| Sogatella furcifera   |        |
| Hemiptera| Delphacidae| Sogatella kolophon    |        |
| Hemiptera| Delphacidae| Unkanodes sapporonus  |        |
| Hemiptera| Lygaeidae  | Nysius plebeius       |        |
| Insect Order | Family | Species Name |
|-------------|--------|--------------|
| Hemiptera   | Miridae| Campylomma lividicornis |
| Hemiptera   | Miridae| Campylomma sp. |
| Hemiptera   | Miridae| Creontiades coloripes |
| Hemiptera   | Miridae| Nesidiocoris tenuis |
| Hemiptera   | Miridae| Orthotylus flavosparsus |
| Hemiptera   | Miridae| Trigonotylus caelestialium |
| Hemiptera   | Nabidae| Prostemma hilgendorfii |
| Hemiptera   | Pentatomidae| Glacius subpunctatus |
| Hemiptera   | Pentatomidae| Nezara antennata |
| Hemiptera   | Piesmatidae| Piesma capitatum |
| Hemiptera   | Piesmatidae| Piesma maculatum |
| Hemiptera   | Rhopalidae| Liorhysus hyalinus |
| Hemiptera   | Rhyparochromidae| Horridipamera inconspicua |
| Hemiptera   | Rhyparochromidae| Paradieuches dissimilis |
| Hemiptera   | Rhyparochromidae| Stigmatonotum rufipes |
| Hemiptera   | Scutelleridae| Cantao ocellatus |
| Hemiptera   | Tingidae| Cantacader lehieri |
| Hemiptera   | Triozidae| Trioza chenopodi |
| Hymenoptera | Bethylidae| Acrepyris minutus |
| Hymenoptera | Braconidae| Apanteles sp. |
| Hymenoptera | Braconidae| Cotesia sp.1 |
| Hymenoptera | Braconidae| Cotesia sp.2 |
| Hymenoptera | Braconidae| Deuterixys sp. |
| Hymenoptera | Braconidae| Lysiphlebus sp. |
| Hymenoptera | Chalcididae| Brachymeria femorata |
| Hymenoptera | Chalcididae| Brachymeria minuta |
| Hymenoptera | Eupelmidae | Eupelmus australiensis |
|------------|------------|------------------------|
| Hymenoptera | Eupelmidae | Eupelmus sp. |
| Hymenoptera | Formicidae | Hypoponera nippona |
| Hymenoptera | Formicidae | Lasius meridionalis |
| Hymenoptera | Formicidae | Monomorium floricola |
| Hymenoptera | Formicidae | Monomorium intrudens |
| Hymenoptera | Formicidae | Myrmecina graminicola nipponica |
| Hymenoptera | Formicidae | Pachycondyla chinensis |
| Hymenoptera | Formicidae | Pheidole fervida |
| Hymenoptera | Formicidae | Ponera japonica |
| Hymenoptera | Formicidae | Pristomyrmex pungens |
| Hymenoptera | Formicidae | Solenopsis japonica |
| Hymenoptera | Formicidae | Strumigenys lewisi |
| Hymenoptera | Formicidae | Tetramorium caespitum |
| Hymenoptera | Ichneumonidae | Homotropus sp. |
| Hymenoptera | Pteromalidae | Halticoptera circulus |
| Lepidoptera | Crambidae | Cnaphalocrocis medinalis |
| Lepidoptera | Crambidae | Diaphania indica |
| Lepidoptera | Crambidae | Maruca vitrata |
| Lepidoptera | Crambidae | Palpita nigropunctalis |
| Lepidoptera | Crambidae | Spoladea recurvals |
| Lepidoptera | Erebididae | Catocala dula |
| Lepidoptera | Geometridae | Odontopera arida |
| Lepidoptera | Geometridae | Scopula ignobilis |
| Lepidoptera | Hesperiidae | Parnara guttatus |
| Lepidoptera | Lycaenidae | Arhopala bazalus |
| Order             | Family       | Species                          |
|-------------------|--------------|----------------------------------|
| Lepidoptera       | Lycaenidae   | Pseudozizeeria maha              |
| Lepidoptera       | Noctuidae    | Agrotis ipsilon                 |
| Lepidoptera       | Noctuidae    | Arcte coerula                    |
| Lepidoptera       | Noctuidae    | Callopistria argyrostricta       |
| Lepidoptera       | Noctuidae    | Cosmia achatina                  |
| Lepidoptera       | Noctuidae    | Daddala lucilia                  |
| Lepidoptera       | Noctuidae    | Diarsia canescens                |
| Lepidoptera       | Noctuidae    | Thyas juno                       |
| Lepidoptera       | Noctuidae    | Macdunnoughia confusa           |
| Lepidoptera       | Noctuidae    | Mythimna separata                |
| Lepidoptera       | Nymphalidae  | Cynthia cardui                   |
| Lepidoptera       | Nymphalidae  | Vanessa indica                   |
| Lepidoptera       | Papilionidae | Papilio xuthus                   |
| Lepidoptera       | Plutellidae  | Plutella xylostella              |
| Lepidoptera       | Pyralidae    | Oncocera semirubella             |
| Lepidoptera       | Sphingidae   | Macroglossum stellatarum         |
| Lepidoptera       | Tortricidae  | Adoxophyes orana                 |
| Lepidoptera       | Tortricidae  | Archips oporana                  |
| Lepidoptera       | Tortricidae  | Cochylidia contumescens          |
| Lepidoptera       | Tortricidae  | Cochylidia richteriana           |
| Lepidoptera       | Tortricidae  | Tortrix sinapina                 |
| Lepidoptera       | Yponomeutidae | Yponomeuta meguronis           |
| Neuroptera         | Chrysopidae  | Chrysopa pallens                 |
| Neuroptera         | Hemerobiidae | Hemerobius humulinus            |
| Neuroptera         | Sisyridae    | Sisya sp.                        |
| Odonata            | Aeshnidae    | Anax parthenope                  |
| Insecta  | Family          | Species                      |
|---------|----------------|------------------------------|
| Odonata | Coenagrionidae | *Ischnura asiatica*          |
| Odonata | Libellulidae   | *Pantala flavescens*         |
| Odonata | Libellulidae   | *Rhyothemis fuliginosa*      |
| Odonata | Libellulidae   | *Sympetrum darwinianum*      |
| Orthoptera | Gryllacrididae | *Nippancistroger* sp.        |
| Orthoptera | Gryllidae     | *Teleogryllus emma*          |
| Orthoptera | Gryllidae     | *Velarifictorus aspersus*    |
| Orthoptera | Mogoplistidae | *Ornebius kanetataki*        |